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ABSTRACT

This guide is intended for architects, district superintendents, and food service directors whose responsibility it is to plan food service facilities. It first discusses the factors to be considered in food service planning, presents cost studies, and lists the responsibilities of those involved in the planning. Other sections concern selection, procurement, and installation of equipment; dining space, serving area, food preparation area; warewashing area; storage; auxiliary areas; and satellites, central kitchens, and other special applications. Within these sections, photographs and sketches accompany the text in detailing equipment standards, location, and utilization. (Photographs may reproduce poorly.) (Author/MLF)

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Design Criteria

school food service facilities

EA 005 195

FOREWORD

This bulletin represents the thoughts and ideas of many people. It is intended as a guide to architects, district superintendents, and food service directors whose responsibility it is to plan food service facilities. It will attain its greatest usefulness by adapting the information to the specific needs of a district.

FLOYD T. CHRISTIAN
Commissioner of Education

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DESIGN CRITERIA — SCHOOL FOOD SERVICE FACILITIES

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DESIGN CRITERIA — SCHOOL FOOD SERVICE FACILITIES

PART I — PRELIMINARY PLANNING INFORMATION

General Authority

The 1972 Legislature enacted a bill "requiring school districts to establish and maintain food and nutrition services designed to serve the needs of all children attending public schools." This law reads in part: "In recognition of the demonstrated relationship between good nutrition and the capacity of children to develop and learn, it is declared to be the policy of the state to safeguard the health and well-being of Florida children by providing standards for school food service and by requiring school districts to establish and maintain an appropriate non-profit school food service program consistent with the nutritional needs of children."(1)

By State Board Regulation, it is the responsibility of the District School Board to "provide facilities and equipment necessary for the efficient and effective operation of the school food service program."(2)

Regulations of the State Board of Education further state that one of the district school board responsibilities is "to provide each pupil under its jurisdiction a meal period appropriately scheduled during the pupil's school day."(3)

Objectives Of Food Service

The objectives of the food service program, as stated in State Board of Education Regulations, are twofold:

- "To provide school food services consistent with the nutritional needs of students. Such services shall include the Type "A" lunch or reimbursed breakfast, priced as a unit, and supplemental nourishment as needed.
- To provide school food services that contribute to the student's educational experiences."(4)

Factors To Be Considered In Food Service Planning

All food service planning has its beginning with the menu. Secondly, but not to be separated from the menu, is the desired quality of food to be served.

If the food service program to be initiated is Type "A" only (defined on p. 2), the system, the equipment, and the space needed will vary considerably from, for example, a program which includes Type "A", plus a la carte, plus breakfast, plus feeding the elderly.

Stressing quality does not infer that a school would desire to serve school children anything less than a high quality of food but that the introduction of pre-portioned foods and convenience foods limits the variety of foods that might be offered. The various physical elements of food service, such as storage space, preparation equip-

ment, and serving space, can greatly affect the total quality and variety of the foods to be offered in the food service program.

Quantity too is an important factor in planning an individual school as well as a district wide school food service program.

Planning must also be centered around costs. Costs of production (both food and labor), cost of capital outlay, and cost of obtaining the desired mealtime environment must be considered. Initial capital outlay investments over and above the minimum often affect labor savings for the life of the building.

As with any other educational program, a well-planned program is the only insurance of a good program.

A well-planned program should attain maximum student participation. History shows that the ultimate of food service programs is one in which students and faculty participated actively in the planning as well as in the operational aspects.

Types Of Food Service Programs

Food Service programs fall into several categories.

Type "A" Only

Food service programs in Florida traditionally have supplied only a complete lunch, reimbursed from federal funds. This lunch consisted of a protein rich food, vegetable or fruit or both, bread and butter, and milk as a beverage. Choice within this framework is necessary in secondary schools. The lunch is priced as a unit.

Combination Program

Further flexibility is now provided. Upon school board approval, other food and beverage sales in a high school may take place. Such a la carte offerings are to be individually priced to cover the costs of all purchased food as well as the cost of donated U. S. D. A. commodities, plus labor, so that a Type "A" lunch priced as a unit is an attractive and obvious bargain. A la carte portions should be the same size as the servings on a Type "A" lunch. A la carte offerings, when available, and Type "A" lunches should be presented in all serving lines. Separate a la carte and Type "A" serving lines are not recommended, since they tend to encourage students to select less than a complete meal.

Breakfast Program

Breakfasts are provided in many schools. If they meet nutritional requirements, they are reimbursable from federal funds. Some equipment adaptations may be necessary, depending on the menu.

Other Supplements

Because of hunger demands of students, or for reasons of unusual scheduling, it is sometimes desirable to serve Type "A" component on an a la carte basis all day long.

Double Session Program

Where schools are on double sessions, or operate during an extended day, four or five places may be designated where boxed or bagged meals are dispensed.

Other Programs

Many other demands may be made on school food service. Groups, such as pre-school migrants, Headstart, Follow through, Late Start, Earn and Learn, pregnant girls, day care trainees, and the elderly, may be served in or by the school. These programs require special facilities, usually in the area of added mobile equipment.

Building Modificiations For Food Service Programs

Program	Building Adaptations	Possible Additional Equipment
Type "A" Only	Standard equipment for storing, preparation, serving, and warewashing disposables.	
Combination Program	More storage, preparation, and serving space.	More preparation equipment, more serving counter "display" areas, grill, fryer, milk shake machine, ice cream cabinet.
Breakfast Program	Possibly remote serving areas or pickup stations. If central serving area is used, bus unloading should be accessible to it.	Toaster, grill, and hot beverage dispenser (in serving area).
Other Supplements	Possibly remote serving areas or pickup stations, for the convenience of students. Storage space and provision for proper cleaning of mobile units (p. 38).	If remote serving areas are used, more mobile equipment and remote refuse receptacles.
Other Programs	Ramps, public access to serving and dining areas (if people come from community to facility).	More mobile equipment, improved dock facilities (if food is transported), special diet preparation area. For very young children served on the premises, dining room furniture needs to be scaled down in size.

Activities Related To Food Service Functional Elements

There are several categories of activities in the production and serving of food:

Receiving
Receiving includes the unloading of food and non-food products from district and commercial trucks and conveyances; checking orders for quantity and specified quality; checking invoices for accuracy.

Storing
Storing includes the storage of consumable food and non-consumable products in case lots, bulk packages, and broken case lots on free standing shelving and portable pallet storage, and/or dunnage racks. Cleaning supplies and paper goods are stored separately. Frozen and refrigerated items are stored at the proper temperature.

Preparation
Preparation includes the total processing of foods from raw to ready. This may involve baking, boiling, steaming, re-heating, raw vegetable and fruit preparation. Space, utensils and equipment used in food preparation are also cleaned.

Transportation
In the event food is prepared one place and served another, transportation activities would include moving food and non-food products, car storage, and cleaning.

Serving
Serving includes the attractive display of the various food offerings, both hot and cold, and the holding and replenishing of these food items as needed.

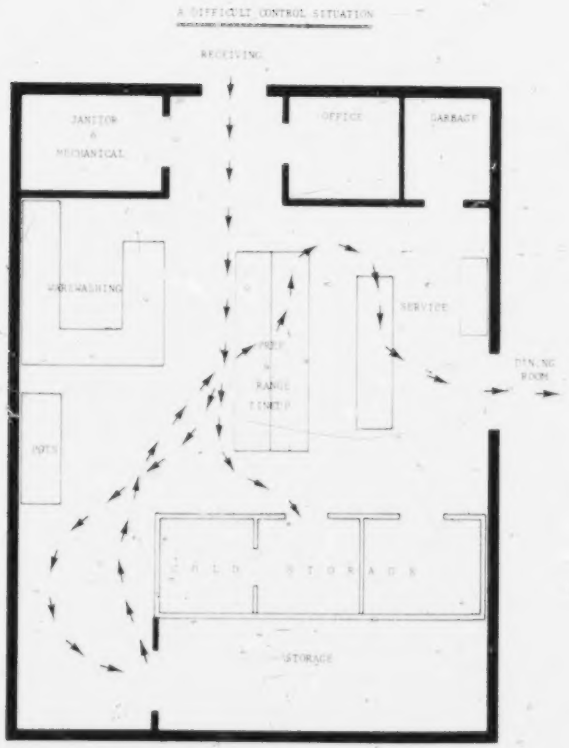
Dining
Dining means proceeding from serving to an eating area which is conducive to to "bon appetit."

Office
The office activities include record-keeping, menu planning, ordering, filing, money-handling, administration, consultations with food service and other personnel and frequently meeting the public.

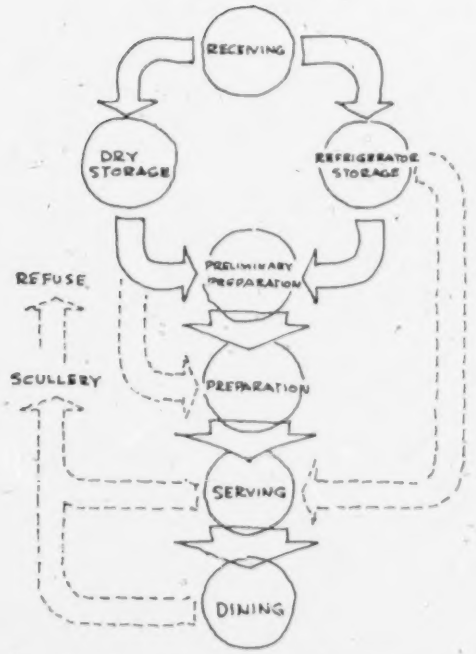
Toilet Area
The toilet area includes the storage of personal items, a place for changing clothing, taking care of body functions and personal sanitation, frequently for both sexes.

Warewashing
Warewashing includes the return of soiled ware for sanitizing or disposal and the collection and disposal of plate waste.

Refuse Area
The refuse area includes the storage and washing of garbage cans.

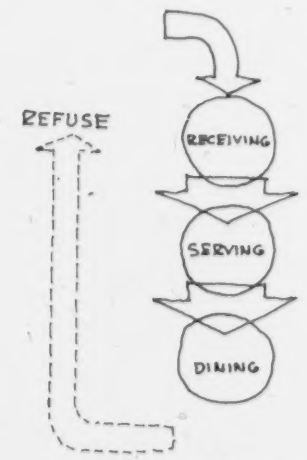


(ARROWS INDICATE FLOW OF FOOD MERCHANDISE)



BASIC KITCHEN & DINING

(ARROWS INDICATE FLOW OF FOOD MERCHANDISE)



SATELLITE

OPERATIONAL FLOW DIAGRAMS

Functional Sequence

Food Service facilities should be planned to provide for the natural flow of raw and prepared material through the preceding functions. This should be accomplished with minimum confusion and crossing of paths. The following flow chart illustrates the relationship of the major areas.

Food Service Systems

A "System" may be defined as the overall performance plan for a school or district-wide food service program. It would include and relate to the logical sequence of tasks to be performed.

The system within a school depends to a great extent upon the system adopted within the district. Therefore, an assessment of present conditions of school food service facilities within the district, including a survey of expected growth, is an essential prerequisite of planning.

Each of the following systems has its own constraints. Decisions on which of the multiplicity of routes to follow are influenced by:

- The desired quality of the end product
- Consumer satisfaction
- Administration satisfaction
- Cost

It is well to bear in mind that food service benefits all of the students; therefore, the per capita cost compares favorably with many other educational programs.

As a help in making decisions preceding the writing of educational specifications, some of the variations within the functional elements (p. 4 to p. 7), are outlined here. The permutations and combinations are unlimited. For further information concerning space and equipment necessary for these fuctions see pages 6 to 13.

Receiving Variations

Foods may be received:

- In the raw state — directly from the vendor or from a district warehouse.
- Partially prepared — e.g. Mixes made up at a central point and delivered to the school; salad ingredients cleaned and ready to assemble.
- Totally prepared — e.g. Baked goods from a district or other bakery; frozen or ready-to-serve entrees.

Storing Variations

Purchased and donated food and non-food items may be stored:

- In a central warehouse and requisitioned by the school.
- In a self-contained or base school.
- In a satellite school.

Preparation Variations

Food may be prepared in:

- Self-contained or on-site kitchen — (food prepared and served on the same premises).

Food Service Systems (continued)

- Base kitchen — (serving two to five schools which do not have basic food preparation equipment and sometimes referred to as "satellites").
- Central kitchen — (separately planned facility which prepares meals in bulk or pre-portioned for many schools).
- Food processing plants and supplied in ready-to-serve form, either pre-portioned or in bulk.
- Sub-processing operations, such as a bakery, product production center or central pre-preparation room for making up mixes, for example.

Transportation Variations

Food may be transported:

- In bulk.
- Preportioned on individual serving trays.
- Frozen, chilled, normal temperature, heated, or a combination of these.
- By truck, trailer, cart, hand-carried container.

Serving Variations

Food may be served from:

- Conventional or built-in serving counter.
- Counter comprised of transported units.
- Mobile units taken to instruction area.
- "Scramble" arrangement.
- Conveyor belt.
- Kiosks or small, multiple serving areas (decentralized dispensing area).
- Mechanical vending.

Dining Variations

Food may be consumed in:

- Dining room, student center, patio, learning space, picnic area, garden, multi-purpose room, the home, or even in the field.

Variations in Type of Eating Utensils

Food may be eaten from or with:

- Disposable service — utensils disposed of by pulpers, shredders, or disposers.
- Permanent ware — washed on premises.
- No eating utensils — "finger foods" prepared ahead and bagged or boxed.

Cost Studies

The first step in making a cost study is to define the requirements.
The second step is to define the feasible alternatives.
The third step is to calculate and compare the costs of the systems identified as feasible alternatives.

These are the elements which need to be considered in making cost comparisons:

Capital Outlay and Equipment Costs

Capital outlay and equipment costs include:

- Building construction costs. e.g. One base kitchen preparing 3,000 meals would

Capital Outlay and Equipment Costs (continued)

normally cost less than five self-contained kitchens serving 600 meals each. A cost study here, however, should include the ongoing operational costs. For example, the study should include a comparison of the savings in capital outlay as compared to the additional ongoing costs of transporting food. The school board should be given an expert judgment of other limiting factors such as:

- Less menu variety
- A satellited school cannot become a community center as easily, especially if either kitchen or dining room is eliminated.

- Maintenance and Repair Costs. The low original cost of building material or equipment does not necessarily denote that it is inexpensive.
- Equipment Costs. e.g. Total equipment costs for one base kitchen vs. total equipment costs for five self-contained kitchens.

Labor Costs

Labor-saving equipment should be considered only in light of its labor-saving potential. The effectiveness of a labor-saving device is directly proportional to the number of employee hours saved. One rule of thumb is if a piece of equipment saves four times an annual wage, it is a good buy. For example, if a roll cutter saves 4 labor hours a day, the yearly saving would be 4 x the prevailing hourly wage x 180 school days x 4 years.

Since labor costs will likely continue to rise, it is imperative to consider using more labor-saving equipment and pre-prepared foods.

In considering labor costs, one should make a distinction between production people and service people. Production people produce. Service people serve, usually at a lower pay rate.

Food Costs

Food costs are also related to equipment and labor costs. Engineered foods, ready-to-serve foods, convenience foods, or whatever the term, require very little processing equipment and no production labor. They are increasingly available. Their higher initial cost should be compared with the cost of raw food, plus production labor, plus production equipment.

The question frequently arises at what point do you utilize donated foods from whatever source? e.g. Some school districts contract with commercial bakeries for bread products made from donated flour, thereby eliminating some of the needs for bakers and baking equipment.

Transportation Costs

e.g. Add the total cost of carts, cabinets, and motor vehicles required to transport food. The necessary labor to do this may be included here or under labor. In any case it must be part of the total projection of costs.

Central Warehouse Costs

e.g. A district warehouse facilitates central purchasing and storing. The financial

Cost Studies (continued)

advantages include volume buying, quality and fiscal control. The disadvantages are high operating and distribution costs, in addition to the initial capital outlay expenditure. Cost studies would assist in deciding whether to provide centralized or decentralized storage.

Other Operating Costs

e.g. Disposable ware vs. permanent ware. Compare the cost per student per day for disposables x 180 days with the total cost of:

- Dish machine annual depreciation of 1/10 value.
- Water heater annual depreciation of 1/10 value.
- Carts and other dish-handling equipment.
- Detergent, wetting agent, etc.
- Utilities to operate dish machine.
- Utilities to heat water.
- Building space.
- Labor required to wash dishes, including availability.
- Cost of trays, dishes, and flatware, including breakage and loss.

Environmental Costs

The environment should be conducive to the enjoyable consumption of food. As one food service director expressed it: "If you are not going to create an environment that attracts students, teachers, or anybody, you might as well not be in business."

Self-Contained vs. Base Or Central Kitchens

Authorities are not entirely in agreement on the merits of centralized versus individual school preparation. Relative values have to be weighed.

Self-Contained Kitchen — Pros

- Attributes which encourage pupil participation are preserved.
- Individual and school initiative are retained.
- Menus are less restrictive.
- Flavor and eye appeal of freshly prepared food are normally superior.
- Transportation and serving costs which **may** outweigh other economies are eliminated.
- No uncertainties are created by traffic conditions encountered in the transportation of food.
- Nutritional value is sustained.
- There is more flexibility with daily changes of attendance.
- Selective menus are possible.
- Large schools (750 meals and up) are better served by self-contained kitchens.
- Use of school as community center is more feasible.
- Management is less complex; therefore, it is more readily available.
- Microbiological hazards are reduced.

Ceneral Kitchen — Pros

- Original capital outlay may be less.

Central Kitchen — Pros (continued)

- Overall quality control of food is more easily attainable.
- Centralization is a practical means of providing meals in a school where no previous food service has existed.
- There may be economy in labor because the preparation cost per meal normally varies inversely with the number of meals prepared.
- Management is more economical and efficient.
- More automatic equipment is practicable, thereby reducing labor costs.
- There are fewer problems of equipment maintenance.
- Food purchasing is more easily controlled and may be more economical because of one-stop delivery.
- There is less total paper work and accounting.

Authority For Educational Specifications

"The educational program needs shall determine the plan and design of the school plant; therefore, the educational program shall be determined by the school board and its staff and then submitted to the architect as the basis on which to develop schematic plans."(5)

How To Write Educational Specifications

Educational specifications are preferably thought through quietly and calmly over an extended period of time, well in advance of actual building. In practice they are frequently written, by several committees working simultaneously, in a crash procedure termed a "charrette," apparently derived from the practice of Beaux Arts students completing architectural projects en route to school "en charrette" or in a cart.

Education specifications should be developed for each planned facility, with the involvement of food service personnel, students, patrons, school administrators, school board members, and other necessary technical assistance.

- Guidelines and example specifications may be used as reference but they should not be adopted "as is."

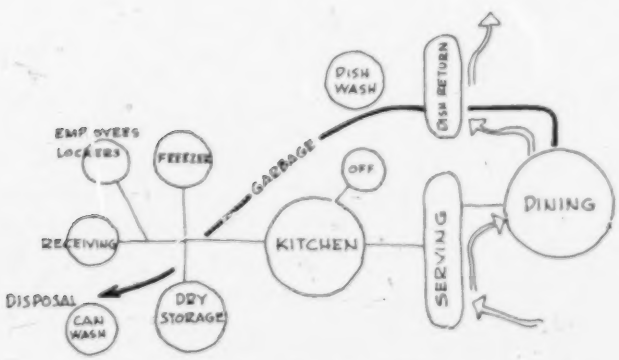
Educational specifications must be submitted to the Department of Education prior to or with schematic or preliminary plans for new construction.

Food service educational specifications should include:

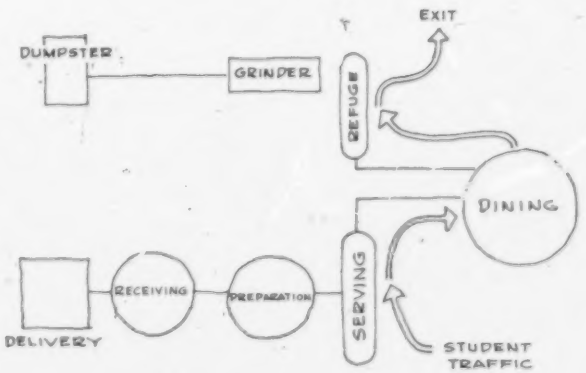
- Philosophy and objectives, such as the relationship of school food service to the total school program; the role of nutrition in the total educational process.
- General objectives of the program.
- Operations type — i.e. Self-contained, central, base or satellite.
- Food offerings – Type "A" lunch, a la carte, snacks, breakfast, etc.
- Service methods — Conventional cafeteria line, mobile units, conveyor, scramble system, etc.
- Initial and ultimate capacity of the facility.
- Age group or groups involved.

How To Write Educational Specifications (continued)

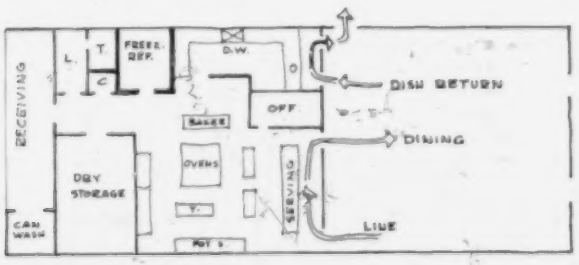
- Time module to be used for serving of food.
- List of spaces required.
- Description of activities associated with spaces.
- Description of innovations or experimental ideas which might be incorporated into the program.
- Functions to be performed.
- Space needs and relationships, including functional sequence. This is usually a bubble diagram. (Figure 2).
- Traffic control — including flow of raw materials, food products and customers, aisle widths, etc.
- Supervision of personnel and materials.
- Provisions for sanitation and safety.
- Worker environment.
- Utilities and services, including type of fuel, steam source, garbage and trash disposal.
- Equipment needed for each function.
- Method of procurement of equipment.
- Finishes — equipment and building.
- Aesthetics, decor, lighting and climate control.
- Insect and rodent control.
- Planning and construction schedule.



BUBBLE DIAGRAM
BASIC KITCHEN



BUBBLE DIAGRAM
SATELLITE KITCHEN



SCHEMATIC PLAN

EXAMPLE OF DEVELOPMENT OF SCHEMATIC PLAN FROM A BUBBLE DIAGRAM

Responsibility Of Architect

The architect is responsible for:

- Submitting preliminary and final plans and specifications as required by Florida Statutes and State Board Regulatons.
- ". . . the structural and mechanical design" of the building based on the educational specifications written by the district. This includes the "structural design and efficiency of any heating, air-conditioning, plumbing, ventilating, or electrical systems."(6)
- Engineering of proper lighting and air exchange for acceptable employee work environment.
- Equipment and space relationships.
- Warranties, start up and demonstration of all food service equipment.

Responsibility Of Food Service Director

The district school food service authority should perform the following functions, relating to planning and equipping food service departments:

- Make detailed cost studies as the basis for the decisions on which educational specifications are written.
- Obtain concurrence from the district administration on the variables to be incorporated into the educational specifications.
- Take the initiative in writing the educational specifications with the help of district administrators, principals, teachers, students, patrons, and other food service personnel.
- Review the educational specifications in final form.
- Be available to the architect on a consultation basis.
- Give architect flow charts and equipment relationship diagrams, taking into consideration the utilization of labor.
- Collect pertinent data concerning equipment and provide architect with this information.
- Review preliminary plans in light of approved educational specifications.

Responsibility Of District Adminstration

The district administration has these responsibilities:

- Make **broad** policy decisions which will affect the building design, such as type of program and service to be provided. These decisions are based on information provided by the food service director.
- Planning of the total food service program with the involvement of students, patrons, teachers, administrators, school board members, etc. The factors of planning for which the administration is responsible include:
  Principles of organization.
  Functions of management.
  Elements of leadership.
  Elements of nutrition.

- Appoint an architect.
- In consultation with the food service director and all persons who should contribute to the planning element, the district administration should approve:
  Educational specifications.
  Preliminary building plans.
  Final building plans and specifications.
- Provide equipment to enable facilities to function properly.

General Space Requirements For Food Service Purposes

This table may be used for the preliminary allocation of space. These figures are based on optimum conditions, including a closed campus, high standards of performance, and complete meals with limited choice. An open campus and a la carte offerings will nullify the figures.

	ELEMENTARY	SECONDARY	
Enrollment	750	1200	2000
Food Service Participation	90%	80%	80%
Meals — approximate no.	675	960	1600
Serving Counters	1	2	3
Dining Room Seating Capacity	225	320	530
Area			
Per Seat — (sq. ft.)	8-14	11-14	11-14
Dining Room — (sq. ft.)	1800-3200	3500-4500	6000-7500
Kitchen (including warewashing and refrigeration — (sq. ft.)	800	1200	1600
Serving — (sq. ft.)	200	400	600
Toilet & Locker — (sq. ft.)	150	200	300
Refuse — (sq. ft.)	100	150	200
Storeroom — (sq. ft.)	350	500	700
TOTAL AREA — (Approx. sq. ft.)	3500-5000	6000-7000	10,000-11,000

PART II — SELECTION, PROCUREMENT, AND INSTALLATION OF EQUIPMENT

The selection of equipment is subject to many considerations, such as quality, capacity, durability, performance, availability of maintenance service, and construction in compliance with established standards.

Quality

Cheap equipment becomes expensive because of rapid deterioration. Wood counter and table tops have been replaced by National Sanitation Foundation approved metal, plastic, and other man-made materials. Stainless steel should be used for sinks, soiled and clean dish tables. They will normally last the lifetime of the building and will re-

duce labor costs. This complies with the Rules, State of Florida, Division of Health:

"New and replacement and multi-use utensils shall be of such material, workmanship and design as to be smooth, easily cleanable, resistant to wear, denting, buckling, pitting, chipping, and brazing. Such equipment and utensils shall be capable of withstanding scrubbing, scouring, repeated corrosive action of cleaning compounds and other normal conditions of operation."(7)

Service Available

Repair and maintenance service available on mechanical equipment may determine its acceptability.

Established Standards

Standards which have been established by various agencies should be incorporated in equipment specifications. Equipment meeting these standards is identified by a seal:

- American Gas Association — Gas equipment.
- American Society of Mechanical Engineers — Steam equipment.
- National Sanitation Foundation — Tables, racks, sinks, cabinets, carts, dispensers, dollies, hot food tables, shelving, pots, pans, bowls, dish machines, proof boxes, ranges, ovens, mobile food conveyors, spreader plates, steam-jacketed kettles, steam cookers, refrigerators, freezers, peelers, grinders, slicers, and mixers are among the items covered.
- Occupational Safety and Health Act (OSHA) — Safety standards.
- Underwriters Laboratories — Electric equipment

Standardization Within A District

The problems of procurement, operation and service are simplified by limiting the number of makes of equipment. Service charges per unit are normally less, when equipment is standardized. Personnel training is simplified.

Modular Coordination Of Equipment

In selecting equipment, one should give some consideration to modular coordination. For example, cooling racks, refrigerators, under-counter and other storage units are available for use with standard pans. Each shelf position spaced on approximately 3" centers will hold one 18" x 26" or two 13" x 18" bun pans.

The extensive use of 18" x 26" pans dictates the selection of oven equipment sized to accommodate these pans and 30" sink compartments to facilitate washing them. Large steamers should be wide enough for two standard 12" x 20" or 13" x 18" pans.

Some effort has been made to convert the long time 12" x 20" standard serving pan to 13" x 18", which is roughly the same volume and conforms admirably to the 18" x 26" module so widely used. Such pans are available and the idea is well worth pursuing.

Use Of Brand Names In Competitive Bids

In an opinion (053-299), rendered November 4, 1953, the Attorney General advised

that: "A lengthy specification composed or designed solely for the purpose of eliminating competitors, other than those able to supply a particular brand name commodity, should be avoided and the actual name or common description should be used when no other of its kind would be equally satisfactory."

This opinion still stands. The designation of a particular brand name in specifications should be based on factual data supporting that preference. When brand names are used the competitive feature of bidding is still preserved by several companies bidding on the trade name and model specified. Food service equipment is not normally sold within a franchised area by a sole distributor.

Equipment Included In The General Contract

There are several methods of procuring and installing equipment. In general, the following practice is recommended:

Items which are attached to the building should be in the construction contract. These may include: sinks, dish tables, dish machines, hoods, stationary shelving, mop racks, soap, towel, and toilet paper dispensers, lockers, mirrors, display areas and bulletin boards, built-in serving and work counters, exhaust fans, water heaters, booster heaters, grease traps and walk-in refrigerators. The district should have the privilege of selecting the type prior to completion of plans and specifications.

Other fixed equipment such as ranges, ovens, compartment steamers, steam-jacketed kettles, and mixers should also be included in the general contract. The advantages of having these items in the general contract are that the general sub-contractor becomes responsible for coordinating the rough-in, delivery, installation, and start-up.

Equipment Items Purchased Directly By The District

Equipment should be a part of the general contract. If purchased separately and directly by the district, it should be installed by the general contractor under the supervision of the equipment contractor. The equipment contractor should deliver to the site, uncrate, and place ready for connecting. A delivery date should be included in the specifications. It should be required of the equipment contractor to start up and instruct in the use of equipment. This too should be included in the specifications.

How To Write Equipment Specifications

Detailed specifications are normally used for kitchen equipment. They must cover every detail concerning material, size, construction and finish. The details included will vary with the item specified. For example, gas range with oven, include: dimensions, material, characteristics of fuel to be used, type, arrangement and B. T. U. rating of burners, oven construction, finish and number of racks, heat controls, automatic lighting and safety features, type of leg or base, type of flu, A.G.A. and N.S.F. approval.

For example, Mixer, include: capacity, finish, construction, type of drive, speed control, horse power of motor, electrical characteristics (voltage, phase and cycle), number of bowls, bowl material and size, raising mechanism, beaters and whips required, bowl dolly, attachment hub and name and type of attachments.

How To Write Equipment Specifications (continued)

Since specifications are part of a contractual agreement, they should be written in mandatory form using the imperative "shall" or "shall be." They should be written in clear, concise and correct English. Sentences should be simple and to the point, but adequacy should not be sacrificed for brevity. Paragraphs should be short and systematically arranged. "Or equal" should be avoided because of difficulties in determining equality and by whom? Sometimes several acceptable products of equal quality are named as standards. Should a contractor wish to use any product other than that specified he must so state clearly. He should also state what difference, if any, will be made in the amount of the bid if such a substitution were to be accepted.

Anything expected in the way of goods and services must be included in the contract, possibly in the instructions to bidders preceding the item by item specifications such as:

- Demonstration of the use of the equipment.
- Service for a period of _____ days.
- _____ sets of parts manual and operating instructions. (Some districts require 3 sets, one set of which is filed and inviolable).

Performance specifications may be used as an effective means of describing a bid item.

e.g., Downdraft fan shall deliver air at a velocity of 1600 Ft. per minute across the entire service entrance opening, measured three feet from the floor level.

e.g., Carpet shall satisfactorily illustrate spot removal for food spillage.

e.g., Dishwasher wash pump shall have a capacity of 235 gallons per minute.

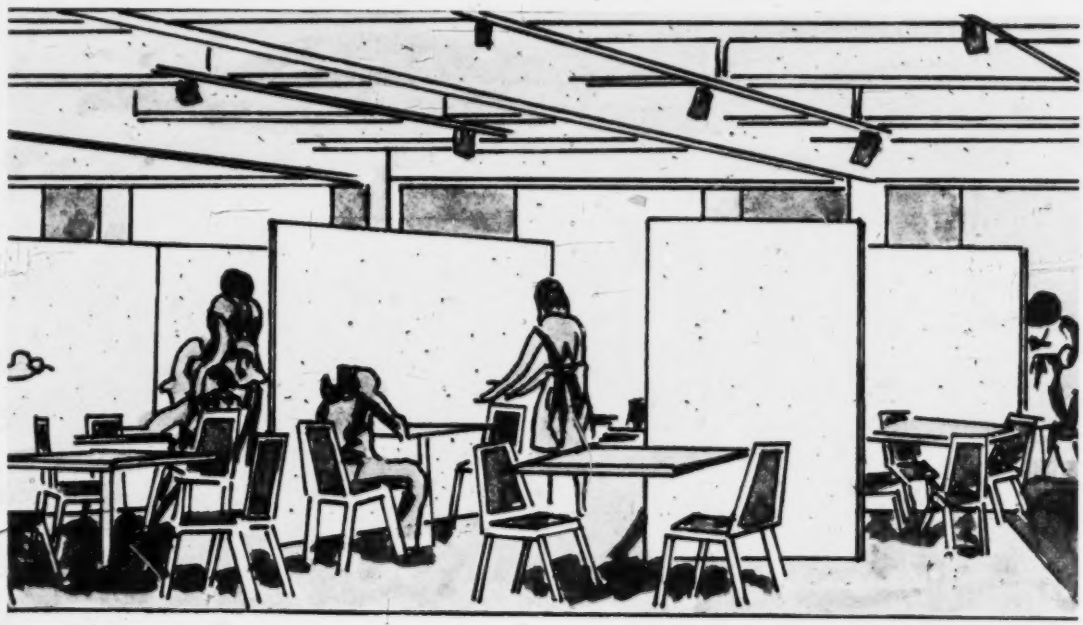
e.g., All faucets and fittings shall be tested 100 Lbs. air Pressure under water.
(For further information concerning specifications, see Appendix p. 58)

PART III — DINING SPACE

Some of the factors which influence the general design of dining space are considered here:

Meal Environment

The dining room should be attractive and inviting to the age group which it serves. Vinyl wall cover, lighting fixtures, including chandeliers, panelling, attractive color schemes, display areas for arts and crafts, landscaping, reflecting pools, courts and patios, are among the means of achieving a good visual environment. On the secondary level the dining room could be treated as a commons area or student center and might include such additions as a parquet dance floor, trophy cases, booths, game area, and piped-in music. Optimum flexibility should be provided. Sight barriers should be introduced to reduce large spaces to more intimate proportions.



Dining Room using sight bearers to reduce large space to more imitate proportions.

The students' perception of the dining room affects the way they feel and behave. It has been suggested that any attempt to get a maximum of students into a minimum of space by lining up long narrow tables, row upon row, leads to an "atmosphere for trouble." To avoid the institutional look, the shape, size, and arrangement of the tables should be varied. Open and differentiated areas are suggested.

The visual environment should not be subverted by the obvious presence of dish washing procedures and refuse collection.

Space For Books

Shelves, racks or cubicles should be provided for books. This makes all of the table space available for eating purposes, eliminates the cluttered appearance, and leaves the students with the obvious advantage of two hands for the mechanics of acquiring food and paying the cashier.

Multi-Use

The educational program of the school may be enhanced by planning the dining area for additional uses such as educational television and large group instruction. Physical education activities should be avoided in any space used for dining purposes.

Size

Dining space should be provided for 90% of the ultimate enrollment in elementary schools. In secondary schools 80% might be a more practical figure. The square footage for the dining area depends on such variations as the configuration of the space, obstructions within it, the size of the students, and the type of tables used. For elementary students, 8 - 10 sq. ft. per seat is allowed where rectangular tables are used, 11 - 14 sq. ft. per seat where square or round tables are used. For secondary students, 11 sq. ft. per seat should be allowed for rectangular tables, 11 - 14 sq. ft. for square or round tables. As indicated previously, a variety of table shapes is desirable.

The number to be fed at one time is a matter for local or district decision. Seating an enormous number at one time increases the capital outlay expenditures. Having many meal periods shatters the instructional schedule and prolongs the service time, thereby increasing operating costs. Three meal periods are normally used, or a continuous period during which students are released at even time intervals, served at a constant rate, and arrive at the dining area in an even flow. Short, occasional breaks in the continuous schedule provide time for convenient replenishment of food and cleanup in the dining room.

Furniture

If the dining room is going to be used for other purposes, the equipment must be easily adaptable, stackable, or collapsible to accommodate those purposes.

The size of the students determines the height of the furniture. However, it should be noted that a 12" difference between chair height and table height provides reasonable comfort for both elementary and secondary students. In general, small students conform better to the larger scale furniture than large students and adults do to small furniture.

Suggested Furniture Height and Linear Allowance

GRADE LEVEL	HEIGHT OF TABLES	HEIGHT OF CHAIRS	LINEAR SPACE PER PERSON
Elementary	25" - 27"	13" - 17"	18" - 24"
Junior High	27" - 30"	15" - 17"	20" - 24"
High School	29" - 30"	17" - 18"	20" - 24"

Standard or mobile folding tables permit considerable flexibility. They may have benches or stools attached, thereby providing fast cleaning of the area, a neat and orderly room appearance and fast conversion for multi-purpose room operations. The disadvantages of the attached seating are that it does not provide individual seating for auditorium functions; it is generally costlier; frequently it does not have backs, and, therefore, it is less comfortable.

Separate stacking chairs provide seating for a variety of purposes: they cost less than the attached seats; they have less of an institutional appearance; and they can advantageously be arranged into rooms with odd configurations. Cleaning is more difficult, resulting in higher man power requirements, and more area per student is required.

Acoustic Control

Noise may be controlled in several ways such as using acoustic ceiling materials, equipping dining room chairs with noise-resisting glides (not needed for carpet), carpeting, draperies, separating warewashing from the dining room, and using disposables or plastic ware.

Drinking Water

An adequate supply of cooled drinking water is necessary, preferably located away from the serving line and dish return area.

Display Area

A display area is desirable for menus, seasonal decorations, educational materials, or for exhibiting student art or other projects.

Lighting And Power Requirements

Multiple purpose dining rooms, which are used for other educational purposes, should have light comparable to instructional foot candle requirements. Grounded electrical outlets should be provided for cleaning, audio-visual and other electrical equipment.

Doors And Windows

"All openings to the outer air shall be effectively protected against the entrance of flies and other flying insects by self-closing doors which open outward, closed windows, screening, controlled air currents or other effective means. Screening material shall be not less than sixteen mesh to the inch. . ."[8]

Dish Return Variations

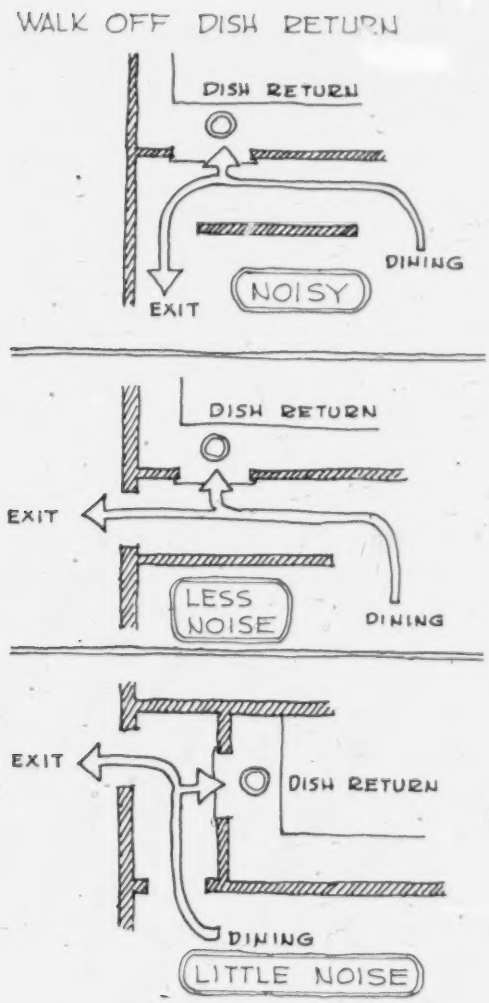
Whether eating utensils are disposable or permanent, it is desirable to minimize the non-aesthetic qualities of the disposing or returning process by one of the following means:

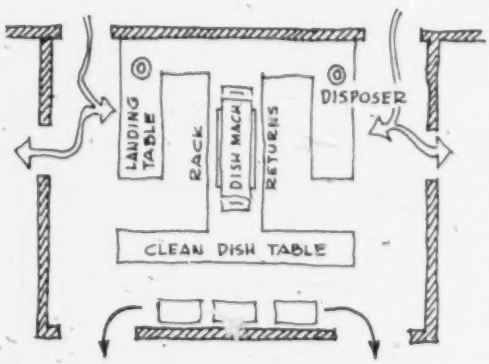
Conveyor Belt

Conveyor belts usually originate in the dining room. Students place trays on a mechanized belt to be conveyed to the warewashing area. This reduces traffic problems and expedites the handling of dishes.

Walk-off Dish Return

The walk-off dish return is planned in such a way that students leave the dining room, deposit trays and exit without returning to the dining area. This removes the warewashing area from view and reduces dining room noise.

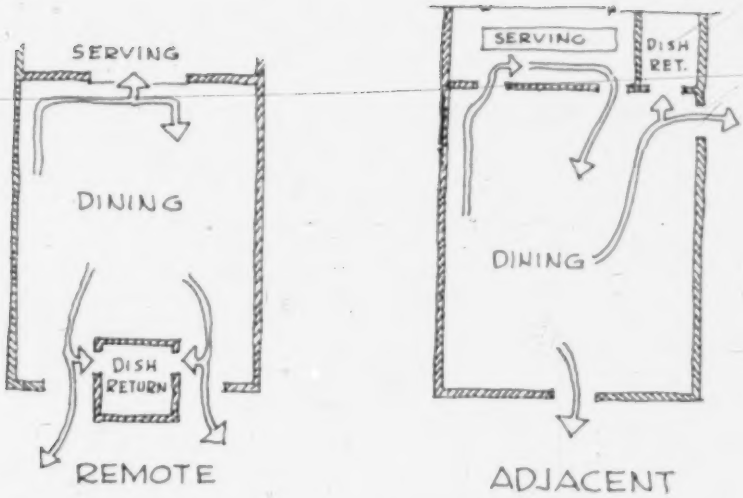




DISH WASHING WITH TWO RETURNS

Remote Dishwashing Area

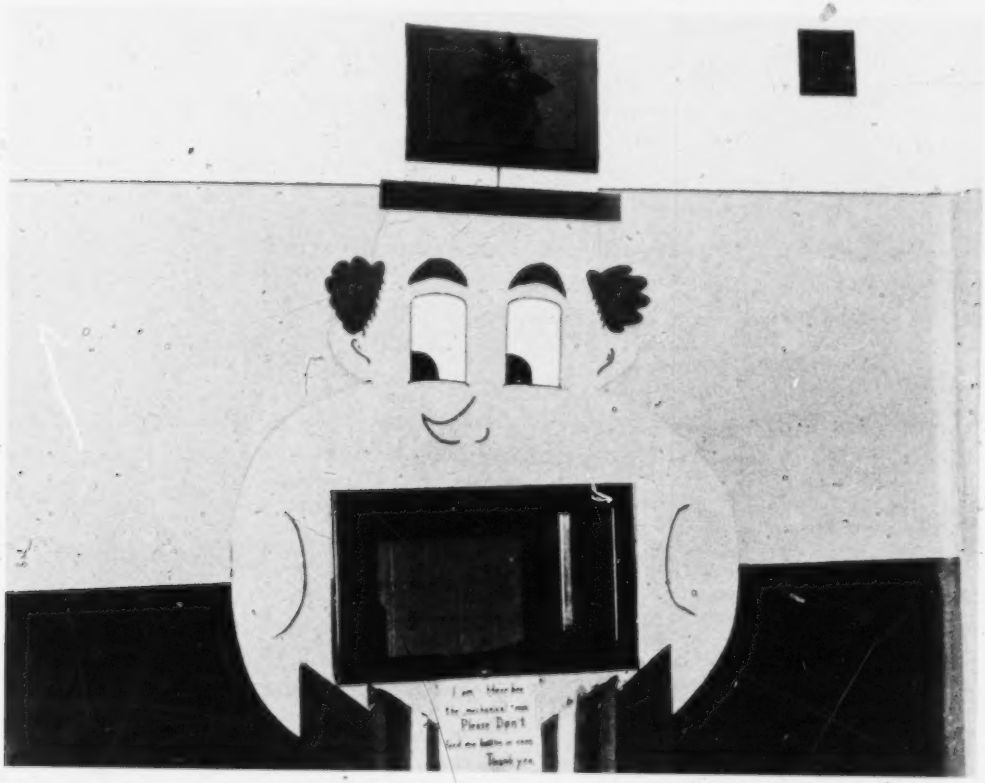
The dishwashing area is sometimes removed from the serving area in order to ensure a smoother flow of traffic from serving to eating to disposal without any cross traffic. If there are more than two serving lines, the dishwashing area should be located away from the serving area.



DISH RETURN IN RELATION TO SERVING LINE

Pulper

Pulpers are also used for disposable ware. They are initially expensive but eliminate handling of garbage, thereby reducing labor. Pulpers grind or pulp the waste and flush it into a press which extracts the water. The water is returned to the pulper for re-use. The waste bulk is reduced to approximately one-fifth its original size.



Pulper chute imaginatively decorated with human design Sign advises children "I am Herr-bee the mechanical man. Please don't feed me bottles or cans. Thank you."

Some materials do not pulp well, notably metal, glass, foamed plastic, rigid plastic straws, plastic film and bones. Paper shreds quickly and evenly and functions as an aid in pulping some of the more difficult materials. The effective use of pulpers may depend on the proportions of various kinds of waste and the willingness of employees to separate the materials which will not pulp readily.

Compactor for Disposable Ware

Compactors are being used extensively in schools, usually where the service is disposable and standard dishwashing equipment is not provided. Compactors need to be child proof, for which reason they are sometimes placed behind a partial wall. The location and placement should be discussed with the administrator. If a compactor is used, the disposables must be "compactable." Some are quite resilient.

PART IV — SERVING AREA

Serving may be organized in several ways. The method used depends on the type of program (p. 3). For example, an a la carte selection of food is not likely to be transported to an instruction area. There are some general considerations which apply to all methods of serving food supplied in bulk.

Finish

Walls adjacent to serving counter and student traffic should be washable.

Soffit

A soffit above the serving counter helps eliminate noise, improves the appearance, and allows concentrated lighting on the food. Pink lighting makes the food more attractive in appearance.

Number Of Serving Counters

The number of serving counters needed depends on the size of the dining space or the number of students released at a given interval. The ratio of one counter for every 200 to 250 seats may be used as a reasonable guide.

Material

The material used for serving counter exteriors may be laminated plastic, molded fiberglass, stainless steel or a combination of these.

Counter Guards

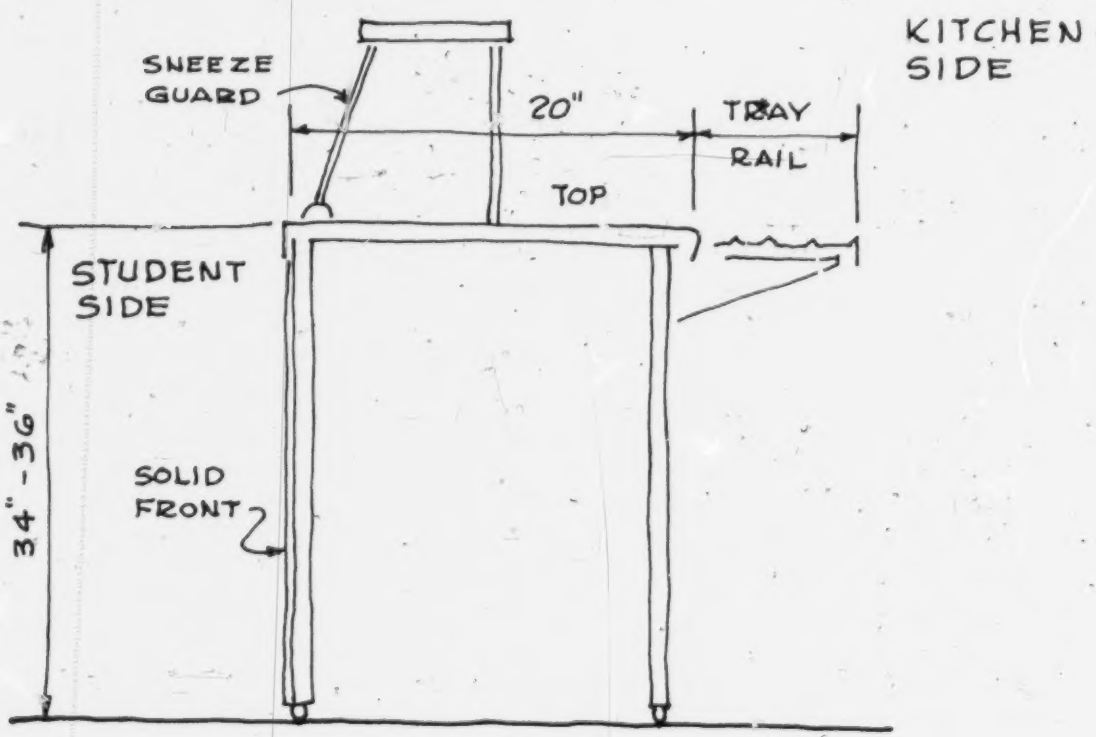
Counter guards are required by the Rules, State of Florida, Division of Health.

"Unwrapped foods, which are displayed or otherwise placed on counters or serving lines . . . , shall be protected against contamination from customers and other sources. Such protection shall be provided by glass or other approved enclosures or by the installation of easily cleanable sneeze guards or other effective counter protector devices designed to intercept a direct line between the mouth of the customer and the food. Self-service openings in counter guards shall be so designed and arranged as to protect food from manual contact by customers." (9)

Counter guards impose some restraints on serving and affect the location of the tray slide.

Tray Slides

A closed type tray slide with inverted "V" ridges is preferred (Figure 6). If a student picks up a tray and moves it, the tray rail is located on the student side of the counter. If food service personnel pick up a tray and move it, the tray rail is located on the workers' side of the counter. In any case, it is recommended that there be a place for depositing a tray at the milk cooler and at the cashier station to prevent spills.



SERVING COUNTER

Dish Storage

Dishes, plates, compartment trays and trays should be stored at the point where they are used. Mobile storage units are recommended. These may be loaded in the dishwashing area and stored under the serving counter. This necessitates leaving clear space under the counter where initial serving of plates occurs. Dish or tray storage should conform to good sanitary practice.

Supplies And Food Replenishment

File units with angle ledges may be provided under or back of the serving counter for 18" x 26" pans, 14" x 18" trays, 12" x 20" pans, or a combination of these, to con-

form to the system. These units must be heated or refrigerated, in which case grounded electrical outlets are needed.

Serving Counter Order

The order may vary, depending on local preference. Counters are available in mobile or fixed modular components which may be assembled in any order, permitting greater flexibility. A description of the usual components follows:

Tray Unit

Tray units should be mobile for loading in the dishwashing area.

Some are self-levelling.

Eating Utensils

Eating utensils may be included in the tray unit. Sometimes cutouts are made in the counter top to receive standard containers. One common dimension for such insert cylinders is 4⅜". "Facilities for the storage of tableware (shall be) designed and maintained to present the handle to the employee or customer and to protect the portion which may contact the customer's mouth."[10] Knife, fork, spoon and straw may be purchased sealed in a plastic envelope or they may be wrapped in a paper napkin.

Hot Items

Standard pans (usually 12" x 20", sometimes 13" x 18") are used for serving. Cutouts to receive these should be provided. The number of cutouts depends on the menu. Where there is air-conditioning or multi-choice, heat is necessary to maintain the temperature of hot foods on the counter. Cutting boards are not recommended for school food service.

Cold Items

Cold items may be held in a refrigerator and served from a flat section of counter or where there is a menu choice, or from an ice pan or refrigerated plate. Drains should be provided. If ice is used, an ice machine near the serving area is recommended. For these purposes use flaked or crushed rather than cubed ice.

Room Temperature Items

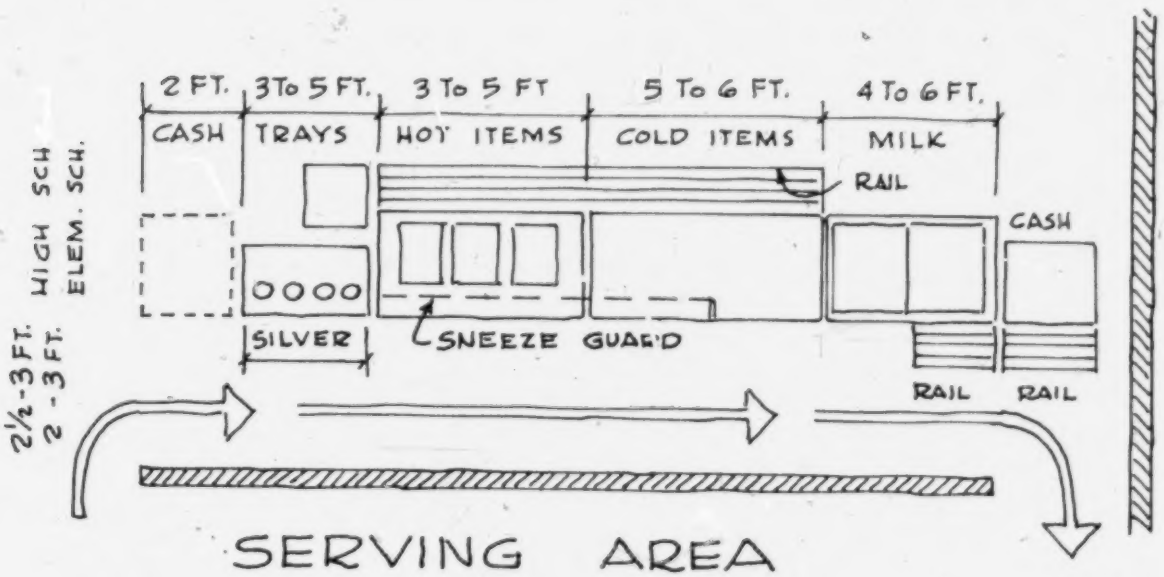
Room temperature items such as some breads and desserts may be served from a flat section of counter or elevated display shelves.

Milk Dispenser

The milk dispenser should be refrigerated and designed for self-service. It may be front-loading or top-loading. Capacity should be large enough to handle extra half pints sold in addition to the one included with the meal. Some milk boxes are self-elevating to keep the containers at the top of the cooler. Some have a condensate evaporator and some require a floor drain. A grounded electrical outlet should be provided. For mobile milk coolers, a locking device is needed on the casters.

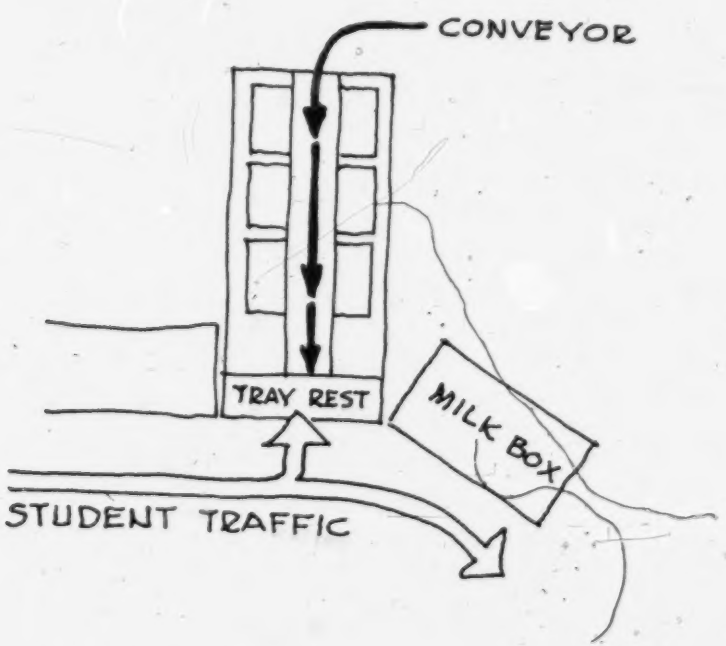
Cashier Space

Cashier space is usually provided at the exit end of the counter. It should include knee space, a place to deposit trays, and grounded electrical outlets if electrical cash registers or ticket equipment are used.



Perpendicular or T-Line Serving Counter

This principle has several applications. Plates or compartment trays may be stacked in the middle or may be moved individually by conveyor. Menu items are served simultaneously from both sides. Food is not exposed to students; therefore, a sneeze guard is not necessary. These counters should be mobile.



Transported Serving Counter Units

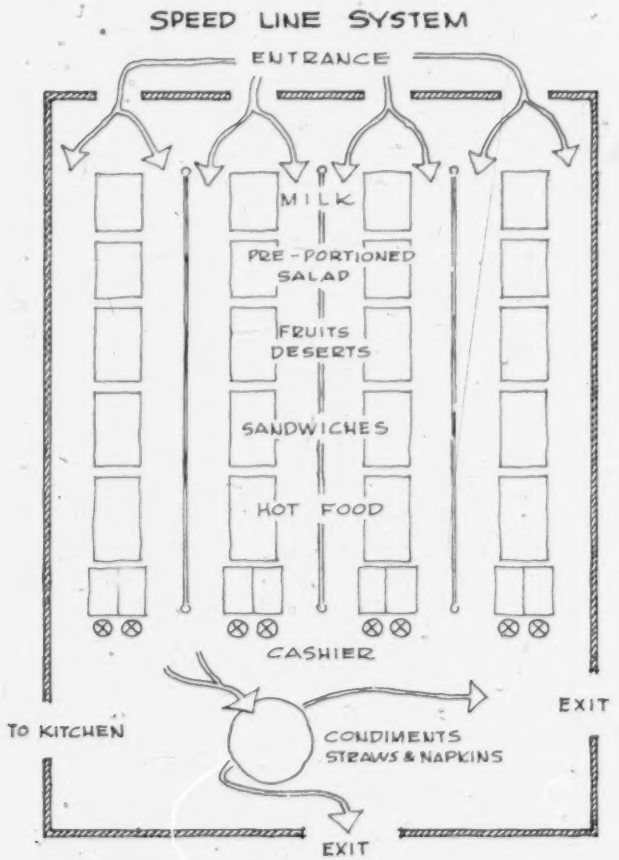
Many types of mobile serving units or conveyors are available which may be loaded in the kitchen and moved to a remote serving area, either manually or by truck. This system is frequently adapted to pod type schools where food is served in several locations. It provides great flexibility and can be quite functional.

Mobile Units Taken To Instruction Area

Mobile units taken to instruction areas are likely to be more compact and complete than those used to comprise a transported serving line to which the students come.

Speed Line

The speed line utilizes self-service and reduces paid labor to a minimum. Students pick up pre-portioned foods from mobile units. In some systems a server places bread and entree on a tray and students select pre-portioned vegetables, salads, desserts, and milk from heated or refrigerated units. These may be self-levelling. The serving units are replenished from back-up cabinets or racks, (Figure 9)



"Scramble" Arrangement

The "scramble" arrangement has been used commercially for many years. It is more suitable for a la carte service than type "A". The general shape is usually a hollow

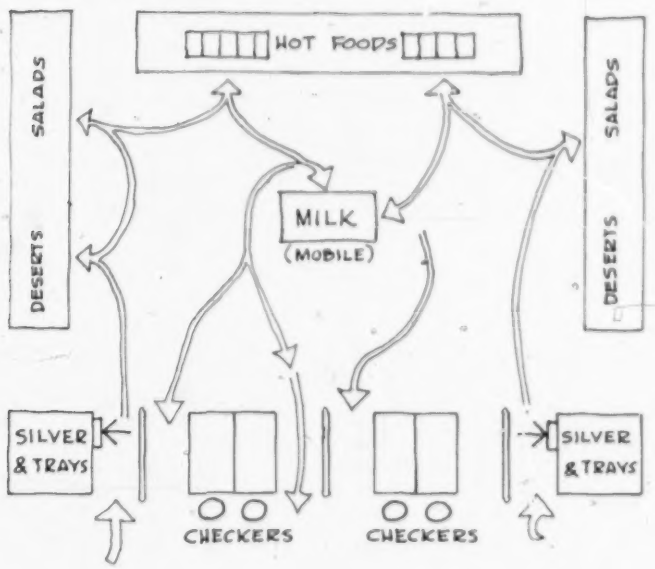
square with serving units on the perimeter and unrestricted traffic through the hollow portion. Entrance is frequently controlled by turnstiles and exit by cashiers. The merit is speed. The student proceeds from one serving point to another, without standing in line for his food choices. Figure 10 illustrates one form of this arrangement.

Conveyor Belt

A conveyor belt has already been mentioned as a possible part of the T-line arrangement in which the tray or plate is assembled in a line perpendicular to the line of student traffic. (Figure 8).

Another application is to extend the conveyor belt from the food preparation area to the serving area. Food is served near the source of supply and conveyed to the dining area. Infra-red heat may be applied en route if necessary.

SCRAMBLE SYSTEM



Vending Machines

Vending machines may have a purpose in the extended school day, for adult and vocational programs or perhaps extracurricular events. They eliminate labor but are expensive, a tampering temptation and rightfully subject to extensive sanitation regulations: "All foods, beverages and ingredients . . . shall be from approved sources. . . . All foods shall be protected . . . Potentially hazardous foods . . . shall be maintained at safe temperatures (40°F or below and 150°F or above) at all times . . . . Controls shall place the machine in an inoperative condition in the event of power failure or other conditions . . . . A thermometer . . . shall be provided . . . . All food-contact surfaces shall be thoroughly cleaned . . . . A record of all cleaning and sanitizing operations shall be maintained in each machine . . . . Vending machines shall be located in a room area, or space which can be maintained in a clean condition . . . The exterior

construction shall . . . facilitate cleaning and prevent entrance of insects and rodents . . . ."[11] For much more complete information refer to Section 10D-13.13 of the Rules, State of Florida, Division of Health.

Kiosks

It is sometimes necessary because of sprawling school plants, or an extended school day, to have multiple serving areas easily accessible to students. Kiosks are one solution and may be imaginative and ornamental as well as functional.

KIOSK

Finishes

Suitable finishes are dictated by the function of the space and, in some cases, by sanitation regulations. They are summed up here.

AREA	DINING ROOM FINISHES
Floor	Non-absorbent materials, easily cleaned Acceptable: Vinyl or vinyl-asbestos, non-absorbent carpet
Base	Coved, of like material
Walls	Smpoth, durable, easily cleaned Acceptable: Plaster (w/surface treatment), ceramic or glazed tile, wood paneling, vinyl or plastic laminates
Ceiling	Easily cleaned, acoustical, light in color Acceptable: Vinyl covered acoustical ceiling tile, plaster (w/surface treatment)

AREA	KITCHEN FINISHES
Floor	Smooth, easily cleaned, non-absorbent, non-slip, grease-proof Acceptable: Quarry Tile, Ceramic Tile (Terazzo & Vinyl prohibited)
Base	Coved, Quarry or Ceramic tile
Walls	Easily cleaned, smooth, non-absorbent Acceptable: Ceramic tile, Keene's cement plaster-enamel paint, Vitro-glaze or plastic laminates, cementitious or Epoxy glazes
Ceiling	Easily cleaned Acceptable: Vinyl covered acoustical ceiling tile, smooth finish plaster

PART V — FOOD PREPARATION AREA

This part applies generally to self-contained or on-site kitchens (food prepared and served on the same premises) and base kitchens (serving two to five schools which do not have basic food preparation equipment). The use of ready-to-serve foods is considered on page 54, satellite kitchens on page 53, and central kitchens on page 54.

Environment

Kitchens too are worthy of visual consideration. Mobile equipment, refrigerators, freezers, walk-in refrigerator doors, ovens, and pylons to support work tables or conceal sink plumbing, are among the items now available in attractive colors which may be coordinated. Employees respond favorably to color.

It is further suggested that man declines when separated from his natural environment, and that a few windows with an outlook of meadow or trees or a walled garden have a salubrious effect.

Air Exchange And Ventilation Engineering

A good ventilating system is one that provides clean, fresh air at a comfortable temperature. In Florida this indicates air-conditioning. Such a system reduces cleaning effort and costs and increases worker efficiency and morale. Carefully calculated mechanical controls are needed in food facilities for attaining satisfactory ventilation standards. A slightly negative pressure in the kitchen will prevent air and odors from flowing from the kitchen to the dining room.

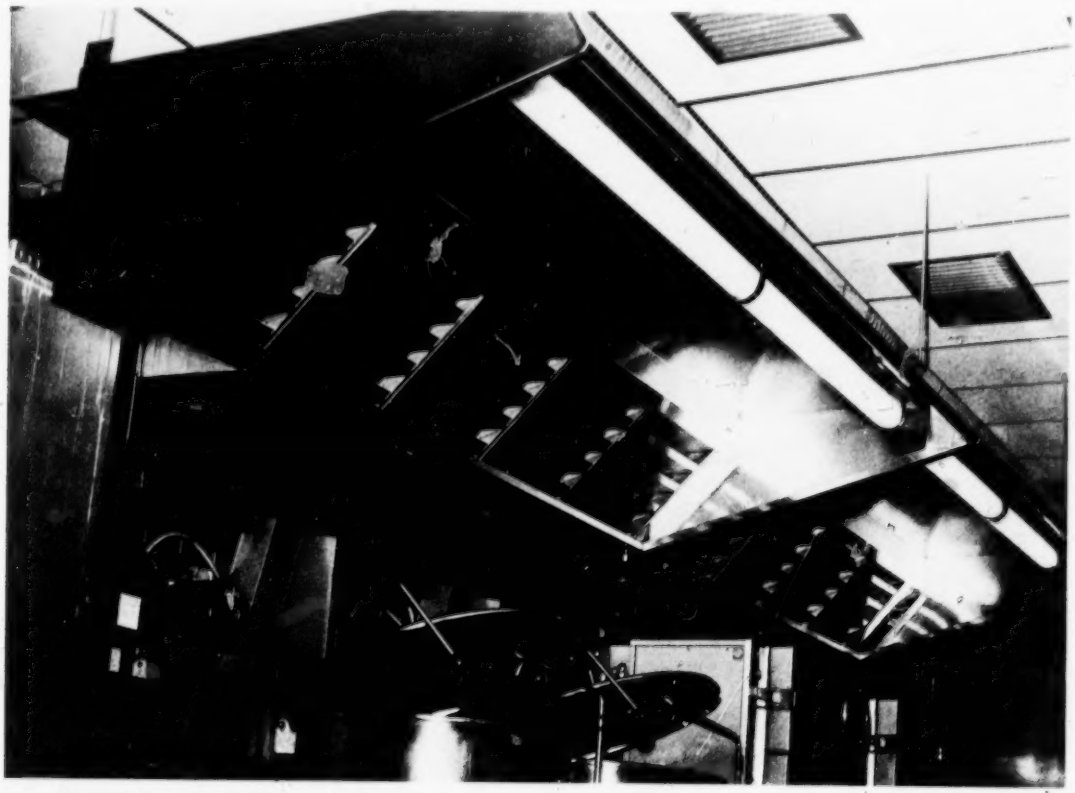
The total cubic volume of the kitchen, calculated without deductions for the volume of contents, should be exhausted at the rate of 20 or 30 times per hour.

In addition to the normal space air-conditioning, special ventilation is needed for ranges, ovens, steam-jacketed kettles, steam cookers, griddles, deep fat fryers, and warewashes.

Manufacturers usually recommend exhaust requirements for their equipment. There are two basic types of ventilation for kitchen equipment:

Undershelf or "Backshelf" Ventilator

The undershelf ventilator projects forward from the rear edge of the cooking equipment. This type of installation catches the heated air and steam closer to the point of origin and draws it through a filter or baffle system. The undershelf ventilator is normally the same length as the cooking equipment. This type is usually custom built, costs more initially than the hood type but is highly efficient. It is designed to exhaust an average of 300 CFM per linear foot. Because it exhausts less air than the canopy type, the backshelf ventilator has economic value in reducing the capacity of air-conditioning equipment needed to maintain a comfortable kitchen environment.



Overhead Canopy or Hood

The overhead canopy overhangs the cooking equipment a minimum of 6" on all sides. The distance from the floor to the lower edge of the hood should not exceed 7' (6'4" or 6'6" recommended). The depth of the hood from the lower to the upper edge should be at least 2'. The hood should have an inlet capacity of 100 CFM per square foot at bottom edge, if it is installed on a wall. If it is an island installation, the inlet capacity should be 150 CFM per square foot of hood face. In order to reduce exhaust capacity requirements, blank-off sheets (not to exceed 50% of total area) may be incorporated. With a blank-off sheet, the inlet capacity of the free area should be based on 150 CFM per square foot. The hood should be equipped with removable, washable filters and incondescent or fluorescent vapor-proof lights. Filters should be 20" square or less in order to be run regularly through the dish machine. Exhaust fans should be furnished with sealed bearings and mounted in such a way as to minimize vibration. Hood should be furred and plastered for cleanliness.

Fire Protection Equipment

"Cooking equipment which may be a source of ignition of grease in the hood, grease removal device, or duct (such as fat fryers, ranges, griddles, and broilers) should be protected by approved extinguishing equipment."[12] Such fire protection equipment consists of means to turn off the ventilator and fuel source, close off the duct opening of the ventilator and extinguish the fire.

Make-up or Replacement Air

Each ventilation job should be designed individually, but as a general design guide, make-up or replacement air should be supplied for 75% - 80% of air exhausted.

The kitchen make-up air system may include air transferred from another air-conditioned area such as the dining room or air introduced from an air-handling unit. In general, the make-up air is introduced as far as possible from the point where the hot air is exhausted. The replacement system should be interlocked with the exhaust system so that neither may be operated independently.

Insect Control

In any food service establishment, positive protection against flies and other insects is necessary.

Self-closing Doors and Screened Windows

The requirements for these are described on page 19.

Downdraft Fans or Air Screens

Air screens (fly fans) are recommended. They should be located over the doors, preferably on the outside. The air stream must cover the entire opening from corner to corner and from top to bottom. This can best be achieved by an air screen unit that has an air discharge nozzle as wide as the opening.

The nozzle should be a minimum of 2" in depth. A deeper nozzle is preferable because insects will penetrate a thin air barrier.

Velocity requirement for a service entrance or deck opening is 1600 feet per minute across the entire opening, measured three feet from the floor level.

An air screen should be instant starting, wired to the door with a limit switch so that it starts when the door is opened and stops when the door is closed.

Electric Devices

There are some approved electric devices on the market which attract flying insects by black light, electrocute them on contact, trap and contain the "remains."

Size

The necessary kitchen space can be determined accurately **only** by making a functional layout. Equipment to be used should serve as the determining factor. Too much space causes extra steps. Too little space results in crowding which in turn creates confusion and inconvenience. Figure 13 may be used as a general guide for the prelimi-

nary allotment of space. Kitchen size is interpreted as including receiving area, refrigerators, preparation area and warewashing. If disposable eating utensils are used, the warewashing area should be deducted, but additional paper storage should be added.

Figure 13 Size of Kitchen

No. Meals Served	Kitchen Area (in sq. ft.)	Approximate Space Per Meal Served (in sq. ft.)
300 — 600	500 — 850	1.4
600 — 1000	850 — 1200	1.2
1000 — 2000	1200 — 1800	.9
2000 — 3000	1800 — 2400	.8

Number Of Employees

The number of employees has some bearing on kitchen planning. This number varies with local practice, amount of labor-saving equipment, menu offerings and the amount of preparation on the premises. The following may be used as a guide only. Prepared foods, disposables and automatic warewashing affect these numbers.

No. Meals Served	No. of Employees
300 — 600	4 — 6
600 — 1000	6 — 10
1000 — 2000	10 — 20
2000 — 3000	20 — 25

Functional Relationships

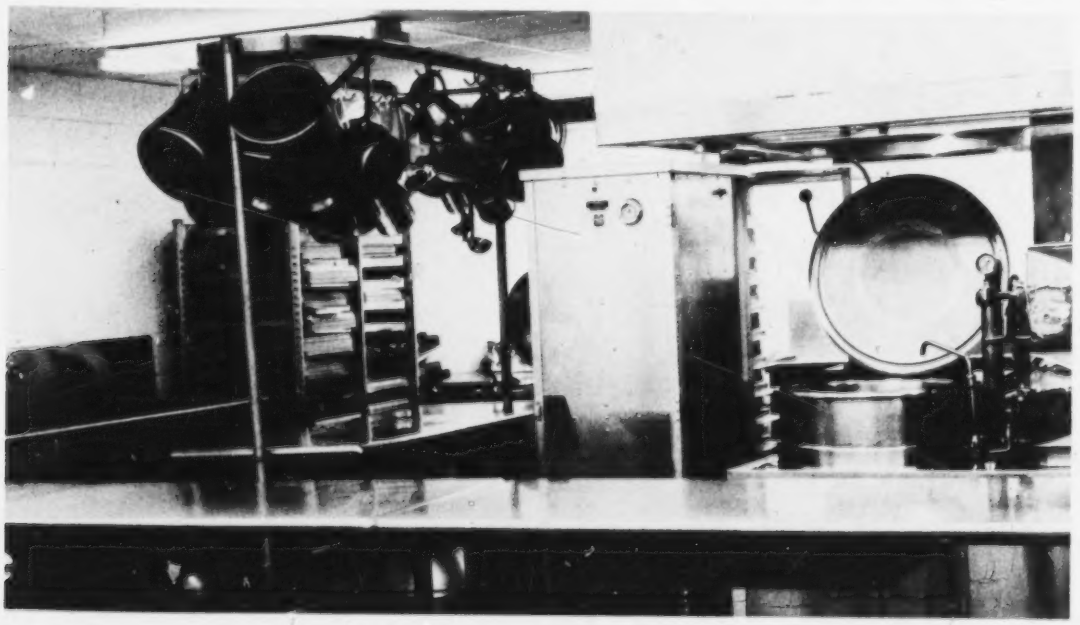
As indicated (Figure 1, p. 5) food proceedsgenerally from receiving to storage to preliminary preparation to preparation serving. Some foods proceed directly from storage to preparation. Others may involve a minimum of preparation and go directly to serving.

A declining labor market gives a greater sense of urgency to the need for optimum productivity. Productivity of employees can be increased with good space engineering. Work centers should be set up in logical order along the food material flow line. Every effort should be made to minimize worker travel due to material movement and equipment placement.

One technique for arriving at decisions regarding equipment placement and space relationships is a "man-machine interaction study." Essentially such a study measures actual distance traveled per employee from one well-defined location to another over a given period of time. e.g.: In one day the baker travels a total of 360 feet to the pot sink, 30 feet to the mixer, 500 feet to the walk-in refrigerator. Therefore, consideration should be given to providing a closer source of water and a more convenient refrigerator, possibly a reach-in, in the baking area.

Various areas may combine or overlap, depending on the size of the operation. In general, the following relationships and provisions are recommended:

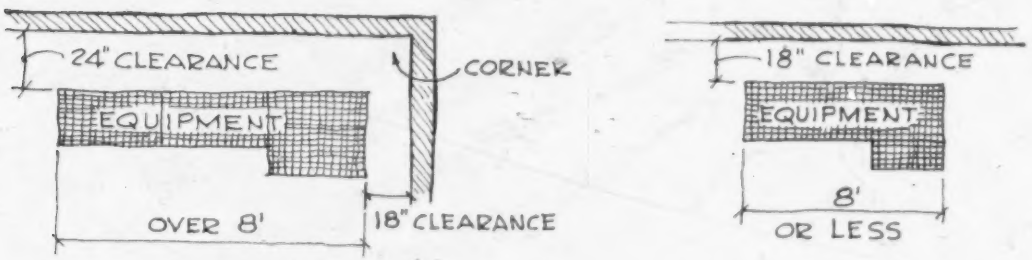
- Cooking equipment should be convenient to the pot sink, refrigerator, necessary utilities such as water source and floor drains, and to that section of the serving counter where hot foods are served. In the case of transported foods, the area where the food carts are loaded must be convenient to the cooking equipment.
- Ovens and baker's table should be convenient to each other and to the pot sink, mixer, and the refrigerator.
- Vegetable sinks should be near the point of delivery, refrigerator, and the cooking equipment. If a vegetable peeler is used, it should also be located in this area.
- Refrigeration should be close to the delivery entrance, vegetable and salad preparation, cook's table, baker's table, and the serving area.
- Landing space, mobile or fixed, should be located for convenience in relation to preparation equipment (range, ovens, steam equipment, fryers, mixers). This is for depositing ingredients, small utensils, and the finished product.
- Planned "parking space" for mobile equipment should be near the point of greatest use. Planned cleaning equipment is also necessary for mobile equipment. Right to left direction. This is usually more convenient for right-handed people than left to right.
- Central or island installation of cooking equipment. This facilitates cleaning and makes it accessible from all sides.
- Grease traps located for easy cleaning.
- Drawers in work tables to store small utensils used at that location.
- Utensil rack over work tables, shelves underneath for convenient utensil storage as needed.
- Temporary storage for soiled utensils in each major work area. This may be a mobile rack or sink but space should be provided for it.
- Access breaks in extended work tables or batteries of equipment.



Installation Of Equipment

Any equipment which is not readily movable should be installed a sufficient distance from any other fixed equipment or wall to allow space for cleaning. The exact distance will depend on the size and type of units. When space behind the equipment which must be cleaned is more than 8' from the open end, the width of such space should be at least 24", if only one end is open, or 18" if both ends are open.

Rules, State of Florida, Division of Health, read as follows: "Equipment shall be so installed as to facilitate the cleaning thereof and of all adjacent areas with the equipment in place, unless the equipment is readily movable for this purpose . . . . Fixed equipment . . . shall be elevated on legs or feet at least six inches above the floor. Such equipment shall be installed flush to the wall with the space closed and sealed; or a sufficient, unobstructed space from the rear wall to the back of the equipment shall be provided to permit cleaning. The space between adjoining units or between the side of a unit and the adjacent wall shall be sealed unless there is sufficient space to allow for ready and thorough cleaning between, behind, and beside all such equipment."(13)



CLEARANCE BETWEEN WALL AND EQUIPMENT

Cooking Fuel

The selection of fuel depends on local utility rates and service as well as on original cost of equipment and upkeep.

Generally, the initial cost of gas equipment is less than electricity. Where gas is used the whole air exchange system has to be engineered for pilots and draw on oven chambers. It is important that gas supply be adequate for the peak demand.

Electric cooking is cooler, and permits greater accuracy of control. Where schools are using large amounts of electricity, the rate structure may be lower. The possibility of cost of a transformer and summer demand charges should be considered.

Aisle Allowances

Optimum aisle allowances are:

- Between oven equipment and work tables — 3½ feet
- Traffic aisles — 3½ — 4 feet
- Traffic aisles where mobile equipment is used — 4 feet
  (Storeroom to cook's table, cook's table and baker's table to serving counter, dish room to serving counter, etc.).
- Between front of refrigerator and other equipment — 3½ feet
- Between two work tables — 3½ feet

Plumbing

Plumbing pipes should not protrude from the floor but should extend from the walls wherever possible. Pipes extending from the walls should have a minimum clearance from the floor of 8". Drainage and waste lines should have accessible clean-outs. Drainage for steam cookers, steam-jacketed kettles, pot sinks, pre-wash and dishwasher shall be through an outside grease trap. (Summary of Mechanical Services, page 68). Disposal units shall by-pass the grease trap

Floor drains and hose bibbs should be provided to facilitate cleaning the floor. Floor drains should be located adjacent to walk-in refrigerators, dishwashers, vegetable peelers, VCM's, steam cookers, steam-jacketed kettles, and reach-in refrigerators and milk boxes not provided with evaporators. In addition, vegetable peelers require a peel trap or a waste disposer. (Summary of Mechaical Services, page 68.

Floor drains should be located away from traffic and work aisles. One eighth inch per foot is suggested as the proper pitch of floor to drains. When the pitch is greater than this, it is difficult to level equipment.

Lighting And Wiring

Both natural and artificial lighting are desirable. If skylights are used, they should be light-diffusing. Thirty to fifty foot candles total are needed at work surfaces. The lighting circuit control panel for all food service areas and power circuit control for kitchen should be readily accessible to the kitchen and not placed in the storeroom. Special wiring and outlets are required for heavy-duty equipment. Voltage requirements of equipment should be furnished the architect at an early date so that he may provide wiring and outlets accordingly. Spare circuits for future needs are necessary. Grounded switches should be within the reach of workers.

Doors

Service entrance, storeroom, and any other doors where mobile equipment is used, should be a minimum of 3½ feet wide. Exterior doors must open outward and be provided with self-closing devices. Door swings need to be considered in placement of equipment.

Bulletin Board

A small bulletin board is needed in the kitchen for posting menus, health cards, work schedules, and other notices.

Vertical Storage

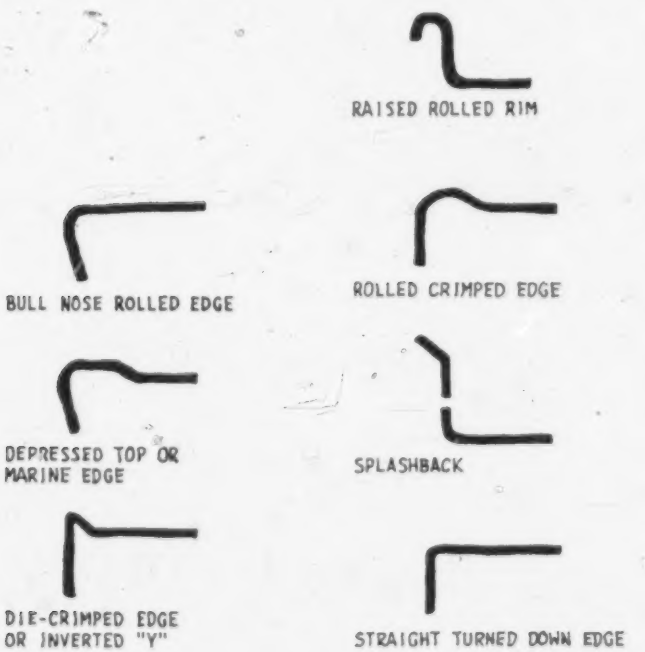
Vertical storage in the kitchen is a means of keeping kitchens compact. Some applications are pan racks, cooling racks, and utensil racks. As many as 20 sheet pans of baked good can be housed vertically in floor space less than 2' x 3'. This leaves work tables free for preparation. Racks for utensils, supplies, or finished products may also be used over other pieces of equipment. Upright freezers have a greater storage capacity for floor area occupied than chest type.

Fabricated Equipment

Stainless steel should be used for sinks, dish tables, and some work tables. The most desirable and commonly used type for kitchen equipment is 18-8, Type 302. It is 18% chrome and 8% nickel and is non-magnetic.

- 14-gauge is a common thickness for table tops or sinks.
- 16-gauge is sometimes used for table tops or sinks. It is lighter than 14-gauge.
- 18-gauge is usually specified for the bodies of cabinets or enclosed type bases.
- 20-gauge is usually specified for short, narrow shelves.
- 22-gauge and 24-gauge is used for wall and other covering.

Vertical and horizontal corners should be coved (specify radius). Handles or finger-grips should be recessed. Edges or rims are formed in a variety of ways, as illustrated.



Welded joints should be carefully ground and polished to restore original finish and remove all signs of the welding.

Rollers on sliding doors should be installed at the top rather than the bottom.

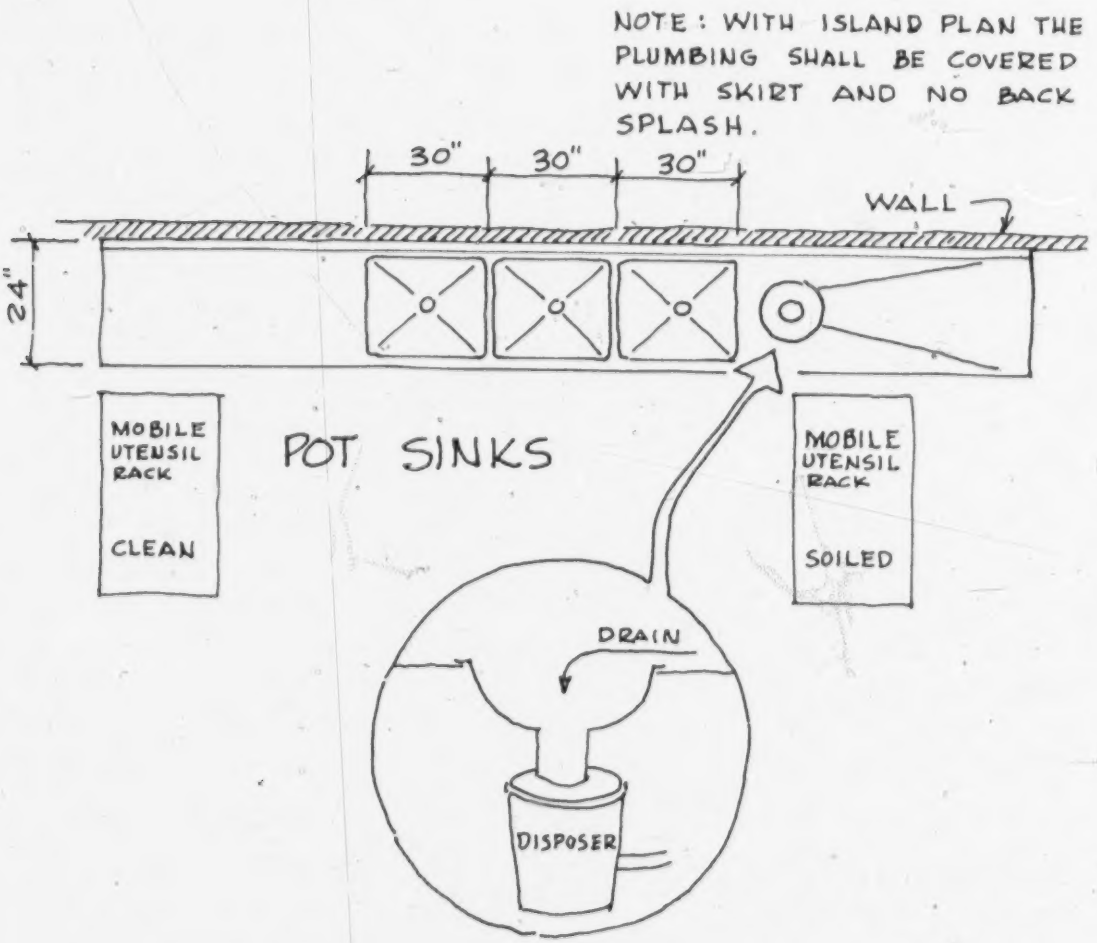
Adjustable feet, usually stainless steel, are recommended for the bottom of pipe or tubular legs. They fit on the inside of the tubular upright, are tapered downward and should have a threaded top for adjusting within one inch.

Pot Washing Arrangement

The process of cleaning pots and pans includes scraping, soaking, washing, rinsing, sanitizing, and drying.

The "scraped" material may be disposed of by one of the following methods:

- Food waste disposer, in or adjacent to pot sink.
- Perforated, removable scrap tray preceding the soaking compartment. This should be level with the top of the sink, 4" - 6" deep and drained. (Figure 15).
- Garbage receptacle.



Pot washing may be accomplished in one of several ways:

- By mechanical dishwasher.
- By water agitator in a pot sink.
- Manually, in a pot sink.
- By mechanical potwasher (large installations).

Where pot sinks are used, at least three compartments are required. "All sinks shall be of adequate size and depth to accommodate the utensils to be washed. . . . Sinks shall be provided with drainboards so located, or so constructed, that soiled and cleaned utensils are kept entirely separate . . . . The hot water system shall provide and maintain water at a temperature of at least 170 °F." (14)

Mobile racks for soiled and clean pots and pans may be used in conjunction with the sink. (Figure 15). A storage shelf may be placed over it.

There should be clear space (no cross bracing) under the sink drainboard or placing a drum of detergent on a dolly

Mobile Equipment

All types of receiving, preparation, holding and serving equipment are being put on wheels: scales, carts, utensil racks, storage bins, shelving, chopping and slicing machines, cooling racks, proofing cabinets, mixers, serving counter units, pot and pan soaking sinks, vegetable peelers, small work tables, etc.

Casters should be easy rolling, durable, moisture and grease resistant, ball bearing and quiet. They should be swivel if it is necessary to maneuver sideways and rigid for long, straight travel. A combination of swivel and rigid is frequently the best solution. Larger wheel diameters move more easily. Casters 5 inches or larger in diameter are recommended. Mobile kitchen machines, especially, should have retractable legs or a locking device.

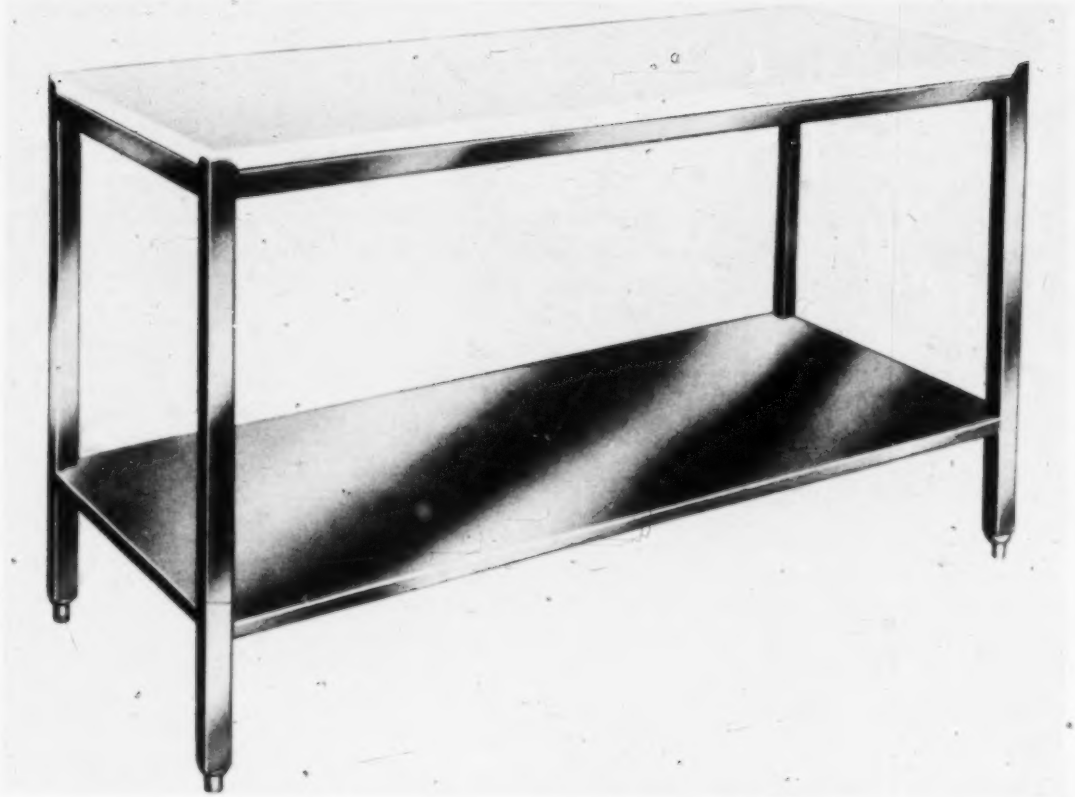
The merits of mobile equipment include:

- Greater flexibility in arrangement and use.
- Ease of cleaning both the equipment and the space around it.
- Economy of effort and time resulting in financial economy.

It is important to plan storage space at the point of greatest use for each piece of mobile equipment, as well as adequate aisle allowances and sufficient turning radii. Normally a four-foot aisle is adequate. Entrance, storeroom, and walk-in refrigerator doors need to be flush and wide enough for using mobile equipment.

Work Tables

Work tables should have either stainless steel or composition tops (NSF approved). For finish of edges or rims of stainless steel table tops see p. 36. Channelling and bracing should be used as required for sturdiness. Composition tops are preferred for baker's tables. Legs should be pipe or tubular, feet adjustable stainless steel.



Drawers are recommended for small utensils. They should have coved corners and operate on roller bearing slides. Friction slides are not satisfactory.

An undershelf for pan storage is a convenience. This may be solid or slatted, sectional and removable. Work tables are also manufactured with cabinet bases. Open space to accommodate mobile storage bins may be preferred, especially for baker's tables. Elevated shelves have a tendency to become catch-alls on which basis they should probably be discouraged.

Pot racks over work tables are considered useful in some circles, a nuisance in others. They are usually table mounted and may be triple bar, cantilever style or revolving circular.

Work tables are available in standard sizes, usually 24" or 30" wide and 4', 5', 6' or 8' long. Sizes other than these do not conform to standardized sheet metal sizes, therefore would be more expensive.

A general rule on work table space is to provide 4 linear feet for each food production employee.

Steam Equipment[15]

Steam equipment is a necessity in the mass production of food. Steam cooking mini-

mizes shrinkage, cooking time and nutritive loss. Steam equipment may be self-contained or direct.

Self-Contained

Self-contained steam equipment has a small boiler designed and fabricated as an integral part of the steam-jacketed kettle or steam cooker. In general, self-contained or self-generated equipment should be restricted to those applications where steam equipment needs are limited. Self-generating steam equipment should have an automatic low water cutoff and a thermostatically controlled heat cutout.

Direct Steam

Direct steam may be supplied from a separate low pressure steam generator which is capable of supplying steam to several pieces of equipment.

The low pressure generator has several advantages:

- Equipment is easier to operate.
- Simultaneous operation of all steam-operated equipment at full capacity is possible.
- Instantaneous heat-up with shorter cooking time.
- Lower operating costs.
- Lower maintenance costs.
- Greater life expectancy of equipment.
- Lower initial equipment and installation costs.
- Steam is available for cleaning, heating the dishwasher tank, and boosting rinse water temperature.

In Florida, steam generators operated at less than 15 PSI do not require a licensed engineer for operating the unit.

Boiler Horsepower Demands of Equipment

Boiler horsepower (BHP) demands vary with the manufacturers of food service equipment. Therefore, care should be exercised to insure that the steam generator capacity will be adequate for the equipment specified, plus allowance for future growth. The system should be designed by an engineer. Commonly accepted boiler horsepower demands of equipment are indicated in Figure 16.

Figure 16 Boiler Horsepower Demands at Equipment

Equipment	Boiler Horsepower Demands
Steamer	1.5 per compartment
Steam-jacketed kettle	.5 per 10-gal. capacity
Single tank conveyor dishwasher	9.0
Double tank conveyor dishwasher	12.0
Single tank flight dishwasher	13.0

Mechanical Services for Steam Equipment

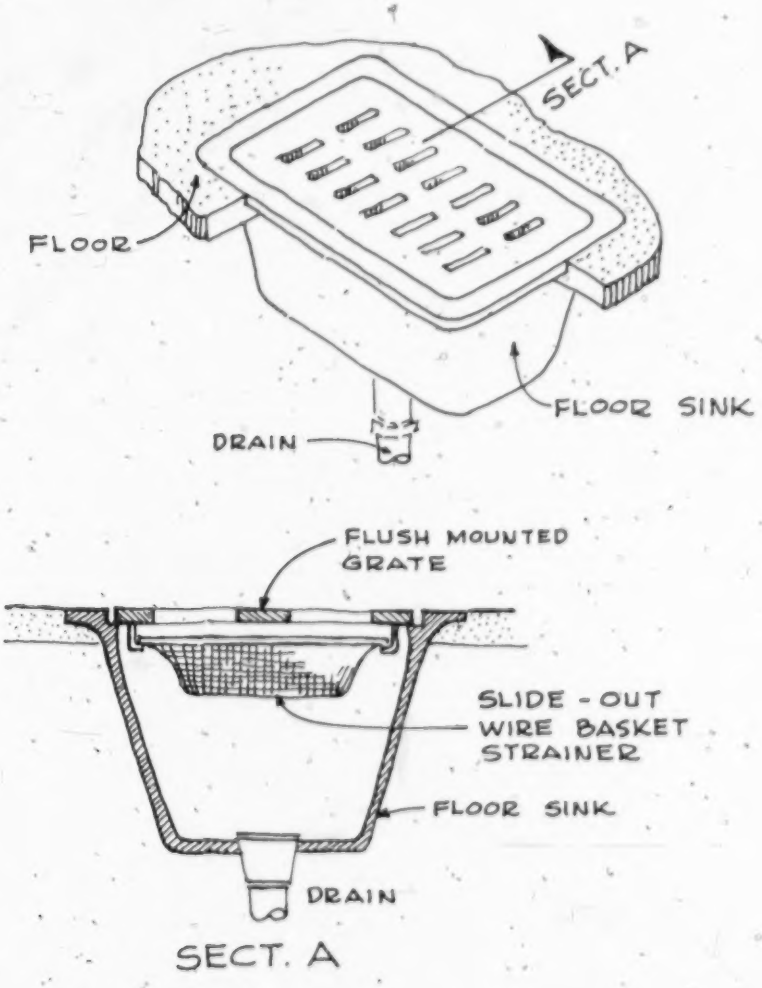
Floor area under steam equipment needs independent drainage through a grease trap. It may be treated in one of several ways.

- Provided with a gutter or floor sink covered with flush grating located immediately in front of the equipment (Figure 17). A movable splash guard should also be supplied between the tangent draw-off on steam jacketed kettles and the floor sink.
- Surrounded by a low curb or drip pan.
- Depressed 2 or 3 inches.

A swivel faucet with hot and cold water is needed for filling and cleaning steam-jacketed kettles.

Water must be supplied for self-contained equipment.

Electricity, gas or steam should be provided as needed.



FLOOR SINK WITH STRAINER

Steam-jacketed Kettles

Steam-jacketed kettles are used for vegetables, meats, cereal products, sauces and puddings. They provide a quick method of cooking and eliminate the dangers incumbent in handling heavy stock pots of hot liquids.

Steam kettles used in schools are usually 40-gallon, 60-gallon or 80-gallon. They may be stationary or tilting (also called trunnion); deep or shallow, full or two-thirds jacketed, mounted on legs, pedestal or wall-mounted. The tilting kettles may be emptied more efficiently than stationary kettles. Shallow kettles are lower therefore easier for stirring and cleaning than the deep kettles. Deep kettles also occupy more floor space. Full-jacketed cook faster because of the larger heating surface. Wall-mounted or pedestal expedite floor cleaning.

Steam Cookers

Steam cookers (also called steamers) have become more specialized in purpose. There are five basic types:

- High compression — operating at 12 to 15 pounds pressure. They are ideal for preparing relatively small quantities of food at top speed. Rapid defrosting in some models is accomplished by direct jets of steam.
- Compartment steam cookers — operating at 5 to 8 pounds pressure. They have one, two, or three compartments and come in several widths. Food is usually cooked in serving pans.
- Atmospheric steam cookers — do not produce steam under pressure, therefore they cook more slowly.
- Food freshners — heat and freshen baked goods, pre-cooked meats, vegetables, and other foods.
- Convection steamers — in which steam circulates by steam zone pressure. Steam is exhausted through a condenser causing continuous turbulence.

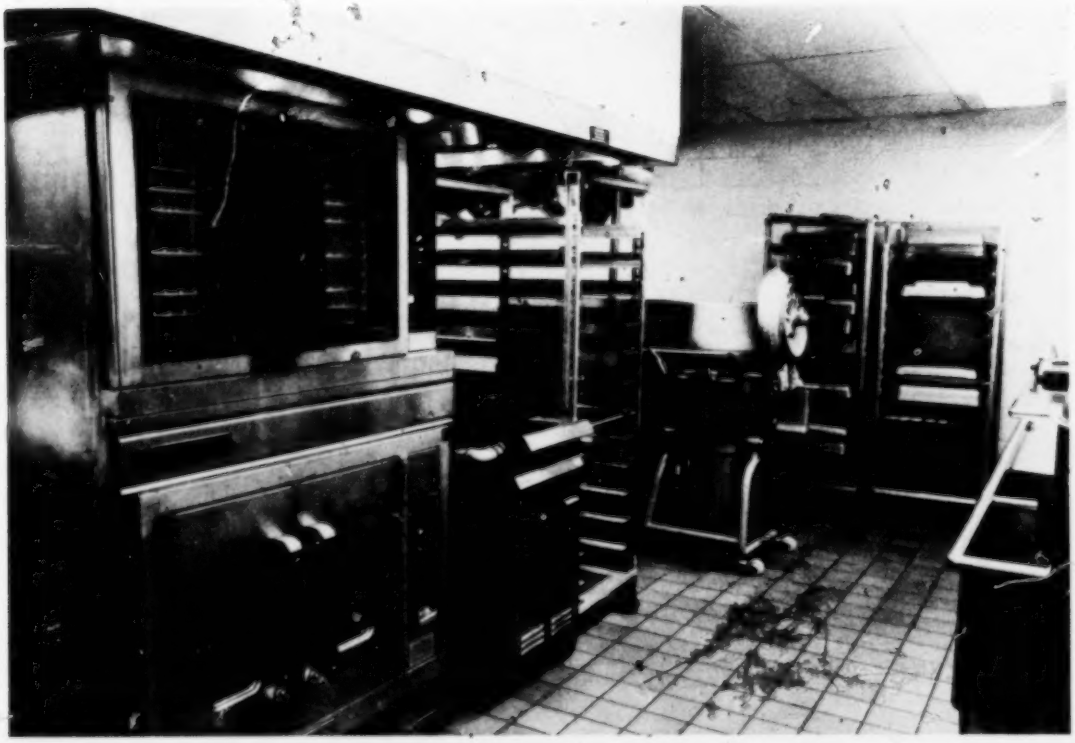
Ranges

Ranges are used less and less in school food service. Where adequate steam equipment and ovens are provided, ranges may be eliminated completely. Some installations include a heavy duty hot plate or a half section of range for emergency heating in small amounts. If ranges are used, they should be heavy duty, solid top. Back shelves are not usually needed.

Ovens

Many oven adaptations have been made for specialized uses.

- Convection ovens — have a motor driven, high velocity fan to circulate heated air within the cooking chamber. This reduces cooking time and enables maximum use of the oven space. Convection ovens can be used for baking, roasting and reheating. They are largely replacing conventional ovens in school food service.
- Conventional ovens — are also referred to as deck or stack ovens. Heat is conducted from the deck to the pans. They occupy more floor space and require as much as twice as long as the convection oven to cook the same product. Roasting ovens have a deck height of 12" to 15". Baking ovens have decks 4" to 8" high. Decks may be used in stacks of three or four. Separately fired decks give best control.



Preparation area showing from left to right two convection ovens (stacked) half range, cooling rack, vertical cutter/mixer, pan racks. Hood over cooking equipment is canopy type furred in plastic.

- Reel or revolving tray ovens — are also called rotary ovens. They have been used commercially for years and are now finding their way into schools. Mechanical ovens are essentially large production ovens, operating on the convection heat principle, with the product moving through the heated space. They bake more uniformly than stationary or non-mechanical ovens. Revolving tray ovens are available in pan capacities ranging from 8 to 80 pans.
- Reconstituting ovens — are also sometimes called food conditioners. They too operate on the convection principle and are especially designed for heating pre-prepared frozen foods. The length of time required to heat from frozen to serving temperature varies from 20 minutes to more than an hour, depending on the make.
- Some recon ovens have roll-in racks on which the food is stored and heated without rehandling.
- Infra-red or quartz-plate ovens — heat to serving temperatures very rapidly but are too small in capacity to handle the volume normally required in school food service. The same is true of microwave ovens.

Tilting Skillets Or Braising Pans

Tilting skillets or braising pans are quite versatile but also quite limited in capacity. They may be used for fry pan, griddle, small kettle, or stock pot. The most likely justification would be for preparing breakfast items on a relatively small scale.

Deep Fat Fryers

Deep fat fryers are regarded as optional equipment. They may be justified in a pro-

gram which supplements the complete lunch with a la carte offerings or where a choice of complete lunches might include regularly such items as fried chicken, fish, or french fries.

Fryer capacities are usually stated in pounds per hour. Multiple small fryers may be more practical than one large one because of the difficulty in handling large baskets and filtering large amounts of fat.

Fryers should have attached or adjacent work table or landing space, automatic temperature controls and twin baskets. Other available features include: timer, automatic lifting, siphoning device which also returns filtered fat to fryer, automatic conveyor and discharge (large capacity), removable tanks and disposable filters.

Mixers

Mixers may be bench or floor type, upright or horizontal (used in bakeshops having high volume). Capacity selected depends on volume needs, handling convenience, and the capacity of related equipment. Most used sizes for school food service are 20-quart, 30-quart, and 60-quart. Mixer accessories include splash cover, bowl dolly, adapter, whip, beater, dough hook, speed drive attachment which increases output, slicer, chopper, shredder and dicer attachments. Extra bowls extend the usefulness of the machine by eliminating some time lags.

Vertical Cutter/Mixers

Vertical cutter/mixers operate at great speed, cut and mix simultaneously, and are used primarily for raw vegetables, meat products and doughs. They do not incorporate air. Capacities are 25, 40, or 60 quarts. They should be installed with a convenient source of water and a floor drain for pouring off cleaning water.

Food Cutters And Choppers

Food cutters and choppers take a variety of forms from a rotating bowl arrangement to a gravity fed hopper. Safety and sanitation features are important. Guards should prevent opertion when knives are uncovered. Cutters should come apart easily for thorough cleaning. Some have an attachment hub.

Slicers

Slicers provide for a wide range of slice thicknesses. Knives vary in diameter from 10" to 12". They feed manually or automatically, and slice angled, or straight. Chute attachments are available. Again, safety and sanitation features are important.

Disposers

Disposers eliminate the labor required in handling garbage. There are three categories:

- Fixed tooth impeller.
- Swinging hammer — using centrifugal force.
- Rotor-shredder — most commonly used for food wastes.

Disposers may be centrally located in the preparation area for multiuse or in other areas such as vegetable preparation and pot-washing. For vegetable preparation, a dis-

poser in large shallow trimming sink is practical. For pot-washing, it may be installed at the base of the soaking compartment or in the work table adjoining the sink. Capacities range from 1 HP to 7½ HP. Installation may include scrapping ring, cone, sink, silver-saver, pre-rinse spray or a variety of water inlets.

Disposers should **not** be connected to grease traps. Two to three inch drains are required. Water line should have ¼" fall per running foot. Quietness of operation is an important selection factor.

Ice Makers

Ice is used primarly in the serving area, but because of the noise factor ice makers may be better located in the kitchen, convenient to the serving area. Crushed or flaked ice is more versatile than cubes. Self-contained units freezing 20 to 600 pounds of ice a day are available. Electricity, cold water and drainage must be provided.

Dough Dividers

If rolls are made on the premises, consideration could be given to saving labor by using a dough divider. An average size dough divider and rounder can shape 1,000 rolls an hour.

PART VI — WAREWASHING AREA

The dish return arrangement was considered in relation to the dining area (p. 20). The operations involved in warewashing (dishes, eating utensils, serving pans and cooking utensils) are presented here in logical sequence.

Silver Handling

In the interest of preservation, silver should be removed first. It may be:

- Dropped through a chute into a mobile soak sink.
- Dropped into a soak pan.
- Dropped into a dish machine rack.

Some schools prefer to sort it directly into containers (tines, blades, and bowls up) which then go through the dish machine to be reversed (handles up) into a clean container, loaded on carts, and returned to the serving area.

In some schools reusable knives, forks and spoons are used with disposable plates or trays, in which case, provision needs to be made for washing the knives, forks and spoons. They may be dropped into a soak or wash sink, washed, rinsed, sanitized and dipped into a "wetting" solution. Relatively small, rectangular sink compartments may be used. Permanent tableware may make the use of disposable plates or trays more aesthetic and acceptable.

Paper Disposal

Disposal of paper may be handled in one of several ways:

- Put into a compactor.
- Put into a waste receptacle, preferably not in the dining room.

- Put into a scrap hole in the soiled dish counter under which there is a waste receptacle. If students remove paper, the scrap holes should be located 6" from the dining room side of the dish table. If the waste is removed from the workers' side, scrap holes should be 6" from that side.
- Put into a pulper (p. 21)

Disposing Of Food Scraps

Again there are several ways of handling this operation. Food scraps may be removed:

- Into a trough with running water which flows into a disposal unit or into a pulper.
- Directly into a disposer fitted with a broad cone. Disposers should be connected to the cold water line and should by-pass the grease trap. They add to the original equipment cost but reduce labor and the need for other garbage-handling equipment and space. Commercial garbage removal is becoming increasingly expensive and is a continuing operational cost.
- Into a garbage receptacle.

Food scraps removed and compartment trays are prewashed in one operation. Food is washed into a disposer. Water is recirculated.

Pre-Wash

The pre-wash operation may be accomplished by either of the following:

- Mechanically operated pre-wash available in standard conveyor or flight type dish machines. This is a completely automatic operation which reduces labor costs. The recirculating type pre-wash is recommended. It utilizes the overflow wash water and detergent from the wash tank and pumps it under pressure.

- Manually operated pre-rinse: Dishes are racked, rinsed with an overhead, spring action, flexible spray over a 22" x 22" x 8" deep sink equipped with a removable rack track and perforated removable baskets. A splash shield may be added along the front edge of the unit to protect the operator. The manual pre-rinse is expensive from the standpoint of labor.

Warewashers

In general, three types are suitable for school food service:

Door Type

The door type operates with less hot water but requires much manual effort. It is suitable only for schools serving less than 400 meals.

Rack Conveyor Type

This is the type for which dishes or trays are racked. The racks are automatically conveyed through pre-wash (when provided), wash and rinse. Machine may be single tank or two-tank, in a variety of capacities. The warewashing arrangement may take several forms:

Flight Type — (also called belt conveyors, rackless or peg-type). These warewashers will handle trays, pots, and pans, in addition to tableware.

The flight type is the most efficient for schools serving 1,000 or more. Dishes, trays, and pans are placed directly on the conveyor, without racking. Unloading is done directly from the conveyor to dish or tray carts. Clean dish tables are not needed. Flight type warewashers may also be installed with the loading end at the dish return window enabling students to place trays on the conveyor in an upright position. A power scraper removes food and soil and may flush it through an attached disposer system. Only one employee at the discharge end is then needed to stack th clean trays. Stacking may also be done automatically.

Blower-Dryers

Blower-dryers are available for use with rack conveyors and flight type warewashers. They expedite the drying process and are especially useful for drying plasticware.

Rinse Injectors

Rinse injectors add a "wetting agent" to the rinse line of the dishwashing machine. This reduces the drying time of dishes, silver, pots and pans.

Hot Water Supply

Hot water should be supplied at 120° to 140°. Rinse water must be 180° at the entrance of the manifold. There are several ways of providing 180° rinse water:

- Two-temperature hot water system.
- A booster heater on the rinse line of the warewasher. This should not be confused with the wash tank heater which is standard equipment on most warewashers.
- Steam injector, or steam coil, where there is a steam generator.

Hose For Cleaning

A flexible hose for cleaning the inside of the machine and the soiled dish tables should be provided.

Remote Dishwashing Area

When the dishwashing area is remote from the serving area, space for dish storage needs to be increased.

Ventilation

Adequate ventilation in the warewashing area is needed. A direct pant leg flue connection from the warewasher is more effective than a vented hood.

PART VII — STORAGE

"Food shall be stored above the floor, on clean shelves, racks, dollies or other clean surfaces in such a manner as to be protected from splash and other contaminations."(16)

Dry Storage

The size of the storeroom depends on purchasing policies, the location of the school, delivery service and whether central storage is available. In general, the storeroom should be approximately one-third the size of the kitchen. Expressed in per meal terms, the size might vary from ¼ square foot per meal served in large schools to ½ square foot per meal served in smaller schools.

Shelves

Movable, adjustable shelves are preferred. If they are fixed, certain optimum dimensions should be observed:

- Vertical clearance between shelves —
  18" or 19" for two stacked cases of #10 cans
  14" for gallon jugs
  12" for wide mouth gallon jars
- Shelf depth — 22"
- Aisles between shelves — 4' minimum

Single or double width shelves in finger arrangement from the wall may be most efficient shelving arrangement. If shelves are built-in, they should be slatted and placed two inches from the wall to allow air circulation.

Storage Containers

Space should be provided for large storage containers on dollies. These are approximately 18" diameter and 40" high. Vertical clearance should be provided under some of the shelving for containers.

Storage Racks or Skids

Portable platforms are recommended for storing cases, bags, drums, etc. off the floor, thus providing mobility and better air circulation. Roughly half of the usable floor space should be without shelving to accommodate such racks.

Ventilation

Positive storeroom ventilation is necessary. Air conditioning is recommended to achieve the 40° - 70° F. optimum temperature for dry food storage. Storeroom air-conditioning must be a separate system so that it continues to operate weekends and on school holidays, when the central system may be turned off. If air-conditioning is not provided, screened louvers might be used in conjunction with a gravity roof ventilator.

Storerooms should be kept free of electric distribution panels, uninsulated pipes, water heaters, refrigerator condensing units or other heat producing components. Any wall between a storeroom and a boiler room should be well insulated.

Security

Positive security must be provided. Storeroom locks should be keyed separately from the master system.

Refrigerated Or Freezer Storage

Refrigerated storage falls into three categories: walk-in, reach-in and roll-in. Temperature may vary according to the purpose, including some refrigerators used for defrosting, which are capable of heating and cooling in order to maintain a constant temperature.

Walk-In Refrigerators

Walk-in refrigerators are a necessity for immediate bulk storage of perishables in hampers, crates, baskets, and boxes, the size and construction of which are not suitable for reach-in storage. They are also needed for semi-prepared and prepared foods in bulk. They should be located to make delivery of foods from receiving to production as short a distance as possible.

Sectional pre-fabricated walk-ins are available in many sizes and finishes. They should have the K-factor equivalent of 4" foamed in place insulation in floor, ceiling, walls, and door and be easily cleanable. The floor should be level with the outside floor to permit the use of mobile equipment and to reduce accidents.

The recommended construction procedure follows: [17]

- Provide a depression in the rough floor slab.
- Thoroughly vapor seal the depression.
- Insulated base frame furnished by the walk-in manufacturer is placed in the depression, shimmed level and securely fastened in place. Door sills are to be level with finished building floor line.
- Area within base frame is filled with insulation.
- Finished floor and base in the walk-in are installed at the same time as other finished floor work in the kitchen.

- Panels are erected on the finished base.

Outside temperature dials should be provided as well as inside emergency opening devices. Shelving should be portable, adjustable, sturdy, and made of non-corrosive materials.

Walk-ins should be sized to accommodate mobile equipment. Eight feet is regarded as minimum width to provide 2½' of storage space on either side of the door and a 3' passage.

In-fitting type doors with full perimeter magnetic gasket are recommended.

Compressor should be remotely mounted and inaccessible to students.

A floor drain should be located on the outside for cleaning, condensate or both.

Walk-in Freezers

Essentially the same information included under walk-in refrigerators (p. 49) applies to walk-in freezers which are merely low temperature refrigerators. Walk-in freezer floors must be insulated.

About 45# of frozen food can be stored per cubic foot. Six feet is considered the effective storage height. Translated into floor space this means that one square foot of walk-in floor area can accommodate approximately 270# of frozen food. Additional floor space, at least equal to the amount required for actual storage, should be allowed for aisles, door openings, and deluges of federally donated commodities.

Heater strips should be provided in full perimeter of door spacing, including sill, to prevent freezing.

Reach-in Refrigerators

Reach-in refrigerators should be furnished as needed for convenience to work units. One guide for estimating the total amount of refrigerator space is ⅙ cu. ft. per meal served.

Reach-ins are equipped with adjustable wire shelves, slides to hold standard 18" x 26" pans or a combination of these.

Inside liners should be seamless. Aluminum is not practical inside or front. Stainless steel or vinyl are recommended. Vinyl cleans easily and does not show marks. It is relatively inexpensive and available in a variety of colors.

Roll-in Refrigerators

A roll-in refrigerator is an adaptation of the standard reach-in, constructed so that the entire contents of a lower door or full height section may be inserted or removed en masse and transported to or from the preparation or service area.

Storage For Cleaning Supplies

Separate storage is needed for cleaning supplies, detergents, mop buckets and brooms.

This area should include a service sink, shelving, and some free floor space for bulk supplies on skids or dollies. Some means of ventilation should be provided. Size depends on the volume of cleaning supplies stored on the premises.

PART VIII — AUXILIARY AREAS

Toilet Facilities

Rules, State of Florida, Division of Health, require that: "Each food service establishment shall be provided with adequate and conveniently located toilet facilities for its employees . . . . Toilet rooms shall be well lighted and adequately ventilated . . . completely enclosed and shall have tight-fitting, self-closing doors . . . they shall not open directly into food preparation and serving areas . . . . Each food service establishment shall be provided with adequate, conveniently located lavatories equipped with running water, hand cleansing soap . . . and approved sanitary towels . . . . Lavatories shall be located in or immediately adjacent to all toilet rooms. In new establishments . . . lavatories shall also be located within food preparation areas."(18)

This space should include a hanging rod for street clothes and uniforms, small individual lockers for personal property, first aid cabinet, chairs or bench and a mirror.

Receiving Area

The amount of space needed for receiving depends on the size and frequency of deliveries. Weighing of foods as they are received is of prime importance; therefore, platform scales are essential. These may be automatic indicating or beam-type, preferably built into the floor to expedite the handling of deliveries. A stand-up desk or shelf is needed for checking invoices. If the system includes transported food in heated or refrigerated food carts, the logical place to provide holding space is in or near the receiving area. Plug-ins should be suspended from the ceiling, preferably the type that travels in a track.

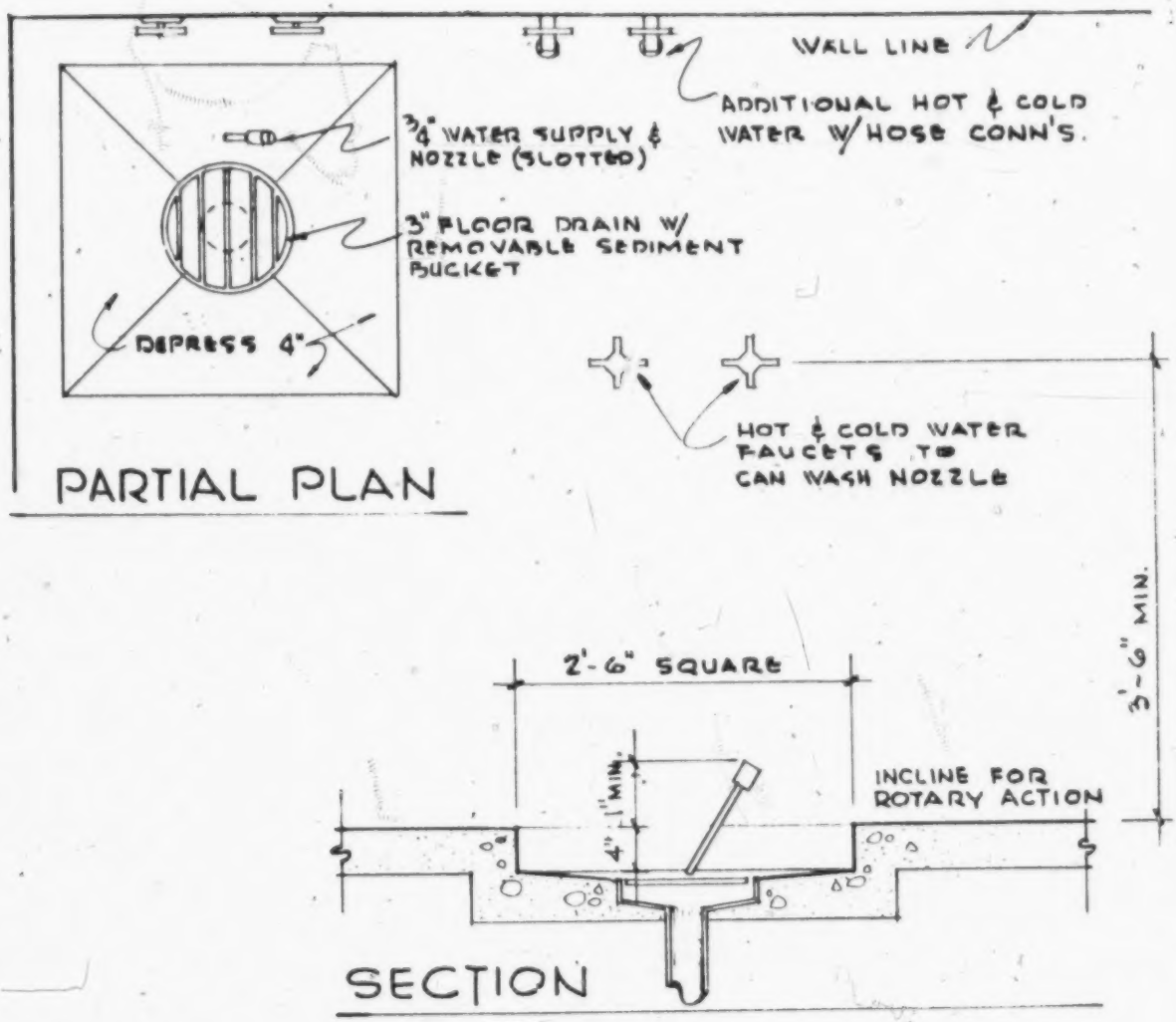
Loading Platform

The loading platform should be the same level as the kitchen floor. Masonry construction with slip resistant surface is recommended. It should be built truck bed height, by excavating the driveway if necessary. This eliminates the need for using a hydraulic lift to load or unload. A protective roof is needed. It should be high enough to clear high trucks. A service drive and turning area should be provided. The maneuvering area should be separated from student activity areas and large enough to accommodate service vehicles. Septic tanks and gas meters or storage tanks should not be located within the service area.

Office

The manager's desk should be located for a view of the entire kitchen. Some means of ventilation should be provided. Office equipment should include a desk, at least two chairs, file, waste basket, telephone, and adding machine or calculator. If the establishment is large enough for a manager and an assistant, space and equipment should be doubled.

Office and storeroom functions are not compatible; therefore, a desk location within the storeroom is not recommended.



CAN WASH DETAILS

FIGURE 18

Cart Washing

Useful in any food service ustablishment, but a necessity where food is transported extensively, is some provision for cleaning transported units or any mobile equipment. This should be a tiled room or enclosure (to contain the splash) with floor drain, steam and water hose and a scrap sink with food waste disposer. If steam is not available some other sanitizing agent or system should be used. The size of the space would depend on the size and quantity of the equipment needing frequent cleaning. Separate entrance and exit doors are recommended to permit soiled equipmet to come in one door and clean equipment to go out the other, in order to minimize confusion. The entrance would be convenient to the loading dock, the exit convenient to the place where the equipment is stored.

Refuse Area

Again there are several methods of handling this unsavory function, all of which should be hidden from view as completely as possible.

Garbage Cans

Where garbage cans are used a screened area is usually provided for positive protection against insects and animals. Space should be allowed for storage of garbage cans, baskets, crates, cartons, tin cans, and, in some cases, trash from the entire school. A facility for washing garbage and trash cans is necessary. This may be a floor drain and nozzle arrangement (Figure 18) or a treadle-operated, prefabricated unit manufactured for that purpose.

Incinerators

Incinerators are largely frowned upon and frequently ruled out by local ordinance because of their air pollution proclivity. However, non-polluting types are available at quite a cost.

Dumpsters

Dumpsters are used frequently to expedite handling. They are more helpful to the pick-up operation than to the school. Standard garbage cans are emptied into the dumpster which is picked up and emptied mechanically. The can-wash arrangement mentioned above is still needed as well as a hose for washing the dumpster.

Compactors

Compactors mentioned on p. 22 are sometimes installed in the refuse area to reduce the volume of garbage and trash.

Pulpers

Pulpers (p. 21) are usually planned to discharge in the refuse area, possibly through an exterior wall directly into a dumpster. This eliminates any need for handling en route.

Bottle and Can Crushers or Shredders

Bottle and can crushers or shredders are not widely used but may be justified where there is a large volume of food production involving bottles and cans.

PART IX — SATELLITES, CENTRAL KITCHENS, AND OTHER SPECIAL APPLICATIONS

Satellite Or Receiving Kitchens

Satellite kitchens are defined as those not having basic food preparation equipment and for which food is prepared at another location, frequently referred to as a base kitchen. Usually all of the functions, except complete preparation, are handled at the satellite:

Receiving

A loading dock is needed for receiving the prepared food, as well as ready-to-serve items such as milk which may be delivered directly to the satellite. The loading area should be roofed for inclement weather, have doors wide enough for the equipment used, and have flooring and sills level enough for mobile equipment.

Storing

Dry storage should be provided for paper goods, cleaning supplies, and emergency canned goods.

- Refrigerated storage is necessary for holding salads, cold desserts, butter, etc., unless they are delivered in insulated or plug-in refrigerated units.
- Freezer storage is sometimes incorporated in the system. Food is delivered frozen and stored in freezers at the schools, removed from the freezer to a holding refrigerator on the day preceding serving. Number and size of the refrigerator and freezer units depend on the menu cycle and the frequency of delivery from the food supplier.

Preparation

Limited preparation is sometimes handled at the satellite school. This could be salads, vegetables, sandwiches or simple desserts. Bulk or pre-portioned prepared foods used in some systems may be heated at the satellite school by means of steam equipment or convection ovens. Some work and landing space is needed.

Serving

Any one of the methods described on pp 22 to 28 may be employed and plans made accordingly. If mobile units are used for holding, space needs to be planned for them.

Warewashing

Warewashing is planned on the premises if permanent ware is used. Depending on the volume, this could be done manually in a 3-compartment sink with 180° water supplied by an immersion heater or by dish machine. A dishwasher with chlorine rinse might be considered in a small satellite.

Management

Handling of money, tickets, requisitions, and other accounting procedures necessitates a desk and file as a minimum.

Toilet Facilities

Some arrangement must be made for rest room facilities and personal lockers or a hanging rod. (pps. 4 and 51).

Refuse Collection

Refuse collection is also necessary in a satellite school. (pps. 4 and 52).

Kitchens Serving Convenience Foods

Foods variously described as prefabricated, engineered, convenience, ready-to-serve, or precooked are now available in a reasonably broad assortment. They may be delivered to the school either pre-portioned or in bulk, usually frozen. Bulk foods may be in disposable pans or in wrapped slabs. As in a satellite kitchen, holding freezers and refrigerators are needed, as well as convection ovens or jet steam cookers, for heating or reconstituting. One convection oven may reconstitute approximately 250 to 350 meals an hour. The capacity of jet steam cookers is expressed in servings rather than complete meals and varies from 1,500 to 4,000 servings per hour. Translated into meals, assuming an average of three frozen items per meal, this would be 500 to 1400 meals an hour. In any case, the rate should be checked out for the equipment specified.

The advantage of using convenience foods totally is the saving in building, equipment and labor costs. The disadvantage is higher food costs which may or may not be compensated by reduced labor costs. Until recently the variety of ready-to-serve foods was limited. The quality and variety are improving rapidly. They are still quite expensive if the quality is good.

Assistance in investigating a total convenience food system is available from district and state school food service directors, independent food service consultants, convenience food processors and distributors and equipment manufacturers.

Ready-to-cook foods are used to some extent in all schools. For example, vegetables may be purchased canned, frozen, dehydrated, or prepared and fresh, in which case there is little need for a vegetable peeler and vegetable sinks. Ready-to-cook meat, poultry, and fish are used extensively making meat handling equipment unnecessary usually.

Central Kitchens

Central kitchens, in the sense of mass food production in a commissary type operation, have been used successfully in some areas, unsuccessfully in others. The advantages of central kitchens and self-contained kitchens are outlined on pp 9 to 10. Planning involves automated filling machines, packaging equipment, and other highly specialized devices. Such central kitchens represent the application of industrial production methods and should be individually planned with the assistance of a competent food service consultant.

Central systems have been devised around hot, chilled or frozen food. Logistically, delivering food hot has too many constraints. Quality losses, microbiological hazards

and the loss of nutrients are among the constraints. The trend is toward chilled or frozen systems. Chilled is cheaper to implement than frozen but still imposes rigid limitations, including a maximum cycle of three days. Salads and some desserts are suitable for delivery chilled.

Frozen foods may be supplied from a central kitchen pre-portioned or in bulk. Pre-portioned is the most efficient but not necessarily the most successful form of delivery. Because of taste, appearance and textural changes in the food, pre-portioned systems are declining in popularity.

Bulk frozen foods may be delivered in disposable pans, reusable pans or in frozen slabs of 8 - 15 portions. The slab method represents minimum packaging costs. In any case, extensive freezing equipment is required, frequently highly automated. Deliveries may be in insulated containers or freezer vehicles.

Sub-Processing Plants

Some districts have found it economical and practical to centralize preparation for some of the menu items. This may be contracted commercially or carried out in a district-operated enterprise. Baking, assembling dry mixes, salad or vegetable preparation, meat fabrication such as hamburger patties are among the operations suited to this organization form. Automated equipment, which could not be justified in a self-contained school, reduces labor costs. Again, these plants are highly specialized and should be planned by a food service consultant.

Specialized Equipment

Some of the school food service applications mentioned on p. 3 require specialized equipment. Again, it should be emphasized that planning begins with the menu. Where special equipment is needed to function efficiently, space and proper installation should be considered in the original planning.

Multiple Choice Type "A" Program

If choices are between two or more of the usual menu items, special additional equipment is probably not needed. For example, such choices as meat loaf or beef stroganoff, scalloped tomatoes or broccoli, pudding, or fruit do not need additional equipment.

If the choice is a low calorie salad plate, including all of the Type "A" components, then an iced salad pan would be an effective merchandising aid, and an ice machine a valuable adjunct. Refrigerated holding equipment for made up salad plates should be available in the serving area. The volume of sales would dictate the type and amount of equipment.

If the choice is, for example, between the regular lunch and hamburger, french fries, fruit, and milk (also Type "A"), then a grill, deep fat fryer, or holding equipment for prepared hot sandwiches might be indicated.

Combination Program, Including A la Carte

Deep fat fryers, ice cream cabinets, bulk milk shake machines, grills and ice makers

are among the equipment that might be needed if the menu warrants. They should be strategically located for efficient service.

Breakfast Programs

Conveyor toaster, grill, or hot beverage dispenser in the serving area might be considered. There are also fruit juice dispensers which reconstitute fruit concentrate by means of a built-in water supply.

Community Use

Adaptations for community use should be encouraged. For example, one Florida community which enjoys frequent fish fries incorporated deep fat fryers in the school service plan. An extra storeroom is sometimes needed for extra-curricular activities or an exterior wall adapted to snack preparation for basketball games or other sports or social events.

Day Camps and Summer Enrichment Programs

Food service facilities are sometimes used on a limited scale for special programs involving smaller numbers. The summer educational enrichment program may entail handling packed lunches brought from home, providing milk, serving a regular lunch, preparing food for field trips or preparing food to be transported to a day camp. These functions can adapt to the regular large equipment. Some modifications or additions might be necessary in small equipment such as insulated carrying containers or serving dishes for family style service.

Feeding the Elderly

Coffee makers may be needed in the serving area where elderly people are served. Emphasis on soft foods might be reflected in serving soups frequently, using round containers accommodated in round serving counter cutouts instead of the usual 12" x 20" rectangles. Ethnic food preferences might call for special preparation methods and some equipment modifications.

Vocational Education

Quantity food service may be taught during the after school hours, using food service facilities for the laboratory experience. The major adaptation is to provide additional equipment such as broilers, microwave ovens, or small trunnion kettles. Additional work space to accommodate 15 to 20 students is also needed.

Planning for vocational training comes under the jurisdiction of the Division of Vocational, Technical, and Adult Education.

REFERENCES

(1) Florida Statutes 228.195(1)

(2) Regulations of the State Board of Education 6A-7.42(2) (b)

(3) Regulations of the State Board of Education 6A-7.42(2) (g)

(4) Regulations of the State Board of Education 6A-741

(5) Regulations of the State Board of Education 6A-2.05

(6) Regulations of the State Board of Education 6A-2.04

(7) Rules, State of Florida, Division of Health 10D-13.06(2)

(8) Rules, State of Florida, Division of Health 10D-13.07(8)

(9) Rules, State of Florida, Division of Health 10D-13.04(12)

(10) Rules, State of Florida, Division of Health 10D-13.06(h)

(11) Rules, State of Florida, Division of Health 10D-13.13

(12) National Fire Protection Association Standard 96,101 — Vapor Removal from Cooking Equipment, 1971

(13) Rules, State of Florida, Division of Health 10D-13.06(3)

(14) Rules, State of Florida, Division of Health 10D-13.06(1) (m)

(15) Information adapted from U.S.D.A. Planning School Food Service Facilities

(16) Rules, State of Florida, Division of Health 10D-13.04(9)

(17) Adapted from Kitchen Planning, Harcourt Brace Jovanovich, Vol. 7 No. 2, Second Quarter, 1970

(18) Rules, State of Florida, Division of Health 10D-13.07(5) (6)

APPENDIX

EQUIPMENT RECOMMENDATIONS AND APPROXIMATE SIZES
SELF-CONTAINED KITCHEN

When dimensions are given, the first figure represents the approximate dimension from side to side, the second figure from front to back. See templates at back of this bulletin.

ITEM	NUMBER OF MEALS SERVED		
	300 — 600	600 — 1000	1000 — 2000
Cooking Equipment			
Range	Half range 18″ x 36″ or 42″	Half range 18″ x 36″ or 42″	Half range 18″ x 36″ or 42″
Oven	Convection oven 1-compartment 5 bun pan capacity. (18″ x 26″ pans) 40″ x 42″	Convection oven 2-compartments 10 bun pan capacity. (18″ x 26″ pans) 40″ x 42″	Convection oven 3-4 compartments 15-20 bun pan capacity. (18″ x 26″ pans) 80″ x 42″ or Receiving tray oven — 12-16 bun pan capacity. 11′ x 7′
Steam Cookers	High compression steam cooker. 1-compartment 24″ x 34″ or 2-compartment (5-8# pressure) 36″ x 34″	High compression steam cooker. 2 compartments 36″ x 34″ or 3-compartment (5-8# pressure) 36″ x 34″	High compression steam cooker. 2-4 compartments 36″-72″ x 34″ or 2 to 3-compartment (5-8# pressure) each 36″ x 34″
Steam-jacketed Kettle	40-Gallon 32″ diameter	1 or 2 40 or 60-gallon 32″-36″ diameter	2 to 4 40 or 60-gallon 32″-40″ diameter
Hood or Ventilator	Should be provided over the cooking unit. (p. 30)		
Sinks, Etc.			
Pot Sink	3-compartment pot sink, 35-38″ high. Compartments — 30″x24″x14″ deep 1 or 2 drain-boards. (p. 37)	3-compartment pot sink, 35-38″ high. Compartments — 30″x24″x14″ deep 1 or 2 drain-boards. (p. 37)	3-compartment pot sink, 35-38″ high. Compartments — 30″x24″x14″ deep 1 or 2 drain-boards. (p. 37)

ITEM	NUMBER OF MEALS SERVED		
	300 — 600	600 — 1000	1000 — 2000
Pot Sink Booster Heater	If booster heater is used for sanitizing, locate in last compartment.		
Vegetable Sink	2-compartment vegetable sink. Compartments — 24"x24"x12" deep, with at least 1 drainboard at least 24" long.	2-compartment vegetable sink. Compartments — 24"x24"x12" deep, with at least 1 drainboard at least 24" long.	2-compartment vegetable sink. Compartments — 24"x24"x12" deep, with at least 1 drainboard at least 24" long.
Cook's Sink	A sink 15"x15"x10" in the cook's table is desirable.		
Pot Filler	A swing faucet or a flexible attachment to supply water for the steam-jacketed kettles is a necessity.		
Hand Sink	Required in food preparation area in new installations. (Rules, State of Florida, Division of Health 10D-13.07(G)		
Service Sink	Desirable, or the garbage can washing facilities may be used for service sink purposes.		
Dish Machines	Single tank, automatic rack conveyor type, with recirculating pre-wash 66" x 30". Installation must assure an adequate hot water supply.	Single tank, automatic rack conveyor type, with recirculating pre-wash 66" x 30". Installation must assure an adequate hot water supply.	Double tank, automatic rack conveyor, with recirculating pre-wash 86" x 30". or Flight type, continuous racking conveyor 14' long (clean dish table not needed). Installation must assure adequate hot water supply.
	Note: Where flow pressure of rinse water line exceeds 25#, a pressure reducing valve should be installed — 20# flow pressure is suggested as a good operating pressure.		
Booster Heater	Booster heater is needed to maintain rinse water at 180°F. temperature at the manifold.		
Food Waste Disposers	Should be provided in the preparation and/or dishwashing area as needed (p. 44).		
Pre-Wash	Needed for all warewashing arrangements, preferably mechanical as part of the warewasher. (p. 46).		

ITEM	NUMBER OF MEALS SERVED		
	300 — 600	600 — 1000	1000 — 2000
Refrig-erator	75 — 200 cu. ft.	150 — 350 cu. ft.	250 — 650 cu. ft.
	¼ to ⅓ cu. ft. net capacity per meal needed, depending on deliveries and commodities. This is in addition to freezer space and milk refrigeration. A walk-in refrigerator is needed in addition to one or more reach-ins. (p. 49).		
Refrig-erators (con't.)	To figure space required for reach-in refrigerators, allow 34" front to back, roughly 30" outside width for each 20 cu. ft. of interior capacity.		
Milk Dispensers	Refrigerated milk dispensers, preferably in the serving line, should be provided in addition to regular refrigeration, at approximately 1 cu. ft. for 40 half pints.		
Freezers	75 — 200 cu. ft.	150 — 350 cu. ft.	250 — 650 cu. ft.
	¼ to ⅓ cu. ft. per meal needed, depending on deliveries, menu and amount of fresh or canned foods used. Upright reach-in freezers are 20-60 cu. ft. capacity, 42"-80"x34". Walk-in freezers may be combined with walk-in refrigerators for economy of operation.		
Tables	A general rule on work table space is to provide 4 linear feet for each food production employee. Adjustable legs for raising or lowering table height are recommended. Stainless steel or composition tops preferred. (p. 38).		
Receiving Table	May be provided near receiving entrance or in storeroom, to handle incoming goods, 4' — 6' long x 30" wide.		
Cook's Table	6'-8' x 30" 34" - 36" high; shelf under, two drawers. May have utensil rack over.	Two 6'-8' x 30", 34" - 36" high; shelf under, two drawers. May have utensil rack over and 15"x15"x10" sink installed in it.	Two 6'-8' x 30", 34" - 36" high; shelf under, two drawers. May have utensil rack over and 15"x15"x10" sink installed in it.
Prepara-tion Table	6'-8' x 30", 34" - 36" high, with shelf under two drawers.	Two 6'-8' x 30" 34" - 36" high, with shelf under two drawers.	Two 6'-8' x 30" 34" - 36" high, with shelf under two drawers.
Baker's Table	6'-8' x 30", 34" - 36" high, Composition top preferred. Base may be left open for storing mobile bins.	6'-8' x 30", 34" - 36" high, Composition top preferred. Base may be left open for storing mobile bins.	Two 6'-8' x 30", 34" - 36" high, Composition top preferred. Base may be left open for storing mobile bins.

ITEM	NUMBER OF MEALS SERVED		
	300 — 600	600 — 1000	1000 — 2000
Soiled Dish Table	10′ x 24″-30″. Trough and water recommended. Scrap holes if needed.	12′ x 24″-30″. Trough and water recommended. Scrap holes if needed.	14′ x 24″-30″. Trough and water recommended. Scrap holes if needed.
	Note: For more information on arrangement see (pp. 45 to 47).		
Clean Dish Table	8′ x 24″-30″	12′ x 24″-30″	16′ x 24″-30″ (not needed with flight type machine).
	Ample space needed for air-drying of dishes in racks (2 linear feet per rack). Drying operation is speeded by adequate hot water supply, the use of a rinse injector and blower-dryers.		
Mobile Items	Floor space should be planned for parking these items at the point of greatest use.		
Utility Trucks (Heavy Duty)	Useful for transporting raw and prepared food, soiled and clean dishes. Number determined by need, 24″ x 40″, with two shelves, 500# capacity.		
Utensil Racks	For transporting and storing pots and pans, 48″-60″ x 26″.		
Mobile Tables	2′ x 4′, same height as work table and serving counter. Useful in conjunction with oven, steam equipment, mixer, slicer, and for transportation within department.		
Cooling Racks	Useful in all departments. Number determined by storage and work space, 27″ deep, in multiples of 21″.		
Dollies	Useful in all departments for milk crates, storage cans, and garbage cans.		
Serving Counter	16′-20′ long x 24″-30″ wide, including refrigerated milk service.	16′-20′ long x 24″-30″ wide, including refrigerated milk service.	16′-20′ long x 24″-30″ wide, including refrigerated milk service.
	Serving counters may be mobile units. Number of counters depends on dining room size. In general, one counter is needed for every 200-250 dining room seats. Electric outlets should be provided for cash registers or ticket equipment. Under counters may be equipped with standard pan slides. Back-up refrigerators are a convenience — possibly pass-through.		
Dish Trucks	Mobile dish trucks may be used under part of serving counter in place of fixed shelving. These are loaded in the warewashing area and used at the serving counter without rehandling of dishes.		

ITEM	NUMBER OF MEALS SERVED		
	300 — 600	600 — 1000	1000 — 2000
Counter Guards	Counter guards required by the Rules, State of Florida, Division of Health — (p. 22).		
Tray Rail	Length of counter and 12" wide may be provided. Closed type with inverted V-ridges preferred. Locate on inside or outside of counter as modus operandi warrants.		
Kitchen Machines			
Mixers	20 or 30-Qt. 24" x 32"-38", with extra bowl.	Two 30-Qt., with extra bowl or One 60-Qt., with dolly and 30-Qt. adapter bowl and beater.	30-Qt. with extra bowl. 60-Qt. with dolly and extra bowl.
Mixer Attachments	Chopper, shredder, slicer and grinder attachments for all mixers above. Also available is a speed drive attachment which increases output.		
Vertical Cutter/Mixer		May be used in lieu of the second mixer and the food cutter. See template in back of this bulletin for dimensions. Water supply, and drain needed (p. 44).	
Peelers	Needed where fresh root or tuberous vegetables are used. 15-20# portable, 17" x 22".		
Slicers	18" x 26"	18" x 26"	Automatic 18" x 26"
Food Cutter (Revolving knives and bowl)		Desirable, 14" bowl, 28" x 24" Not needed if vertical cutter/mixer is provided.	Desirable, 18" bowl, 28" x 24"
Vegetable Cutter and Slicer (Hopper Type)		Desirable	36" x 24"
Ice Makers	Should be provided as needed where large quantities of ice are used.		
Miscellaneous items			
Bulletin Board	Approximately 2' x 4' for posting menus, work schedules, miscellaneous notices, health cards, and sanitation reports.		
Clock	Installed for best visibility.		

ITEM	NUMBER OF MEALS SERVED		
	300 — 600	600 — 1000	1000 — 2000
Fire Extinguisher	Carbon dioxide 5-15# size, 2.	Carbon dioxide 5-15# size, 2 or 3.	Carbon dioxide 5-15# size, 3 or 4.
Soap Dispenser Toilet Paper Towel Dispenser	Should be selected in collaboration with local authority and appropriate for the type used.		
Scales	Platform type needed in every receiving area. Baker's scales needed in preparation area.		
Special Areas			
Storage for Cleaning Supplies	Separate storage space needed for dry mops, brooms, buckets, cleaning compounds, etc. This should be well ventilated and include a mop rack and shelves for cleaning supplies.		
Office Space	Every department should have at least a desk, a chair, and file drawer. Separate office space is desirable. (p. 51).		
Lounge	Lavatory, toilet and locker facilities for employees. Should include space for one or two chairs; dressing table and mirror; first aid cabinet; hanging rod for clothing; individual lockers for small objects.		
Garbage Can Washing Area	Needed for all departments, unless a pulper is used. Floor should be same level as kitchen. Hot and cold water connections and floor drain within a depressed section. (p. 52).		
Dining Room			
Tables	A variety in size and shape of tables avoids a regimented regular pattern. Eight is regarded as the maximum number to seat at one table. (p. 17).		
Chairs	One per person for largest service period; 17" is suggested as a suitable seat height for all age groups. Sturdy construction, light in weight, saddle seat, no slats in back. No cross bars in reach of feet. Top of back not more than 2" above height of table. (p. 18).		
Water Cooler	These may have an extra fountain on the side, for small children.		
Display Area	Desirable in every dining room for student art work, menus, seasonal decorations, and educational materials.		

SUMMARY OF MECHANICAL SERVICES FOR SCHOOL FOOD SERVICE EQUIPMENT

ITEM	DRAINAGE				WATER			FUEL
	Direct	Indirect	Through Grease Trap	140° F.	180° F.	Cold	Elec. Motor	Elec. or Gas
Kitchen Area:								
Oven, convection							x	x
Range								x
Steam-jacketed kettle			x	x	or	x		x
Steam Cooker			x	x	or	x		x
Deep Fat Fryer								x
Cutter or chopper							x	
Mixer							x	
Vertical Cutter Mixer		x		x	or	x	x	
Vegetable Peeler	x or	x				x	x	
Slicer							x	
Frozen food cabinet							x	
Reach-in refrigerator		x					x	
Walk-in refrigerator		x					x	
Ice Maker		x				x	x	
Cook's sink	x			x		x		
Hand lavatory	x			x		x		
Pot sink			x	x	x	x		x
Vegetable sink	x			x		x		
Serving Area:								
Heated unit		x		x				x
Refrigerated unit		x				x		
Milk cooler		x					x	
Milk dispenser		x					x	
Compactor							x	
Warewashing Area:								
Prewash unit			x	x		x	x	
Food Waste disposer	x					x	x	
Warewashing machine		→	x	x	x		x	x
Dishwashing sink			x	x	x	x		x

HOT WATER REQUIREMENTS
SCHOOL FOOD SERVICE DEPARTMENTS

MEALS SERVED	GAL. 140° WATER PER STUDENT AVERAGE	TOTAL GAL. 140° WATER	TOTAL RACKS SOILED DISHES (SEE 1.)	TOTAL GAL. 180° RINSE REQUIRED (SEE 2.)	HOT WATER REQUIRED IN 2-HR. PEAK DEMAND	
					GAL. 140°	GAL. 140° to boost to 180° (SEE 3.)
300 to 600	1.5	900	120	240	495	240
600 to 1000	1.2	1200	200	400	660	400
1000 to 2000	1.0	2000	400	640	1100	640

1. Based on use of permanent ware: one rack soiled dishes for five students.
2. Based on warewasher rinse requirements at 20 pounds pressure:

   300 — 1000 meals — single tank, rack conveyor type, 2 gallons rinse water per rack.

   1000 — 2000 meals —double tank, rack conveyor type or flight type, 1.6 gallons rinse water per rack.
3. Two hour peak: 55% of total 140° water and all of 180° water used.
4. Hard water will quickly result in a decrease of capacity. Water softeners recommended.

SANITATION CHECK LIST

- Adequate handwashing facilities located in the kitchen as well as in the employees lounge.
- Adequate water of at least 170°F. for sanitizing dishes and utensils.
- Sink compartments large enough to accommodate utensils to be washed.
- Dish machine flow pressure not less than 15 nor more than 25 pounds per square inch on the water line at the machine and not less than 10 pounds per square inch at the rinse nozzles.
- Adequate refrigeration (40°F. or below): adequate frozen storage (0°F. or below).
- Placement of equipment with space for proper cleaning and maintenance. (Equipment Placement, page 34).
- All outside openings protected by screens or controlled air currents.
- Use of impervious, durable, non-toxic, non-corrosive materials for equipment and multi-use utensils.
- Stationary equipment elevated at least 6" to permit cleaning under it.
- Equipment on casters where feasible.
- A minimum of horizontal pipes.
- Accessibility of cleaning equipment.
- Efficient food waste disposal.
- Disposers provided with not less than a 2" waste line. Each disposer connected and trapped separately from any other fixture.
- Hose bibb and floor drains in kitchen for hosing the floor.
- Adequate drainage properly placed.
- Hose bibbs in other strategic spots such as the hot water line of warewashers for flushing out machines.
- Adequate grease trap properly placed.
- Adequate lighting.
- Adequate ventilation including local exhaust ventilation over all cooking units.
- Filters readily removable for cleaning.
- Serving counter protected against contamination from students.
- Toilet facilities provided for employees.
- Toilet rooms completely enclosed and having self-closing doors.
- Floors smooth, durable, non-absorbent and easily cleanable.
- Conformance with all other health department requirements affecting food service.

SAFETY CHECK LIST

- Proper grounding of all electrical outlets.
- Dish machines and other switches located away from source of moisture, but within comfortable reach of workers.
- Electrical switches located so that they can be reached readily in the event of an emergency.
- Enclosed motors for power equipment.
- Safety features on equipment such as guards on slicing machines, safety latches on walk-in refrigerators, counter-sunk handles on cabinets, rounded corners, temperature controls.
- Fans properly guarded.
- Accessible fire extinguishers.
- To avoid accidental scalding, 180° water service to the rinse line of the dishwasher and the rinse compartment of the pot sink only.
- Work surface 34" - 36" high to prevent unnecessary strains and fatigue. Adjustable height is preferred.
- Equipment of a size which women can handle easily.
- Slip-proof floors.
- Traffic flow such that students or employees do not collide while carrying trays.
- Exterior doors opening outward.
- Accessible and complete first aid kit.

SPECIFICATIONS GUIDE FOR CARPET TO BE USED IN DINING ROOMS
MINIMUM NATURAL REQUIREMENTS

1. **Construction**
   Tufted construction, level loop, or
   Tufted construction, shear cut alternate loop, or
   Tufted construction, cut and loop
2. **Face Yarn Type**
   Continuous filament nylon (also, Antron II or Cadon)
3. **Face Yarn Size and Ply**
   4900 denier (2450 x 2 ply)
   4500 denier (1500 x 3 ply)
   4900 denier (1225 x 4 ply)
4. **Face Yarn Weight**
   No less than 28 Oz. per square yard
5. **Tufts per Square Inch**
   No less than 64
6. **Pile Height**
   No less than 0.225 inches
7. **Primary Back**
   No less than 3.5 Oz. non-woven polypropylene
8. **Backcoating**
   No less than 32 Oz. polyvinylchloride
9. **Coloration**
   Continuous piece dyeing
10. **Static Dispersal Medium**
    No less than 3% stainless steel filaments plyed into yarn
11. **Underpadding (or self-padding) not required — Use direct application**

TEST METHODS

Tear Strength Test	ASTM D 2261-64T	Ounces required to rip
Tuft Pullout Test	ASTM D 1335-60T	Report average tuft find
Crockfastness Test	AATCC 8-1969	5 on 5
Wetfastness Test	AATCC 107-1968	4.5 on 5
Colorfastness Test	AATCC 16E-1964	4.5 on 5 80 SFH
Flammability Test	DOC FF 1-70	No closer than 1" to edge of cover disc.
Stain Removal	Satisfactory illustration of spot removal for expected spillage in rug area.	
Size Change	Satisfactory illustration that carpet will not permanently enlarge or shrink due to weltage in rug area.	

SUGGESTED CONDITIONS TO BE INCLUDED IN INVITATIONS FOR BIDS COVERING FOOD SERVICE EQUIPMENT

Bids will be received at _____ (location) on food service equipment as specified until _____ (time and date). Bids received after the specified hour will not be considered.

Bid price will remain firm for additional purchases for _____ days after bid opening.

The equipment contractor shall furnish equipment as specified. Delivery within _____ (days) of letting of the contract shall be FOB to _____ (address). The equipment contractor shall deliver to the site, uncrate and place ready for connecting. The mechanical contractor will provide all waste, vent, gas steam and condensate return services and complete the connection. The electrical contractor will furnish necessary wiring and conduit connections and will make the connection.

Equipment contractor will be penalized $_____ for each day he is delinquent in meeting contract requirements. A performance bond of _____% of the total contract is required of the bidder.

Equipment bid shall include specification sheets, showing physical size of equipment, electrical or gas requirements and capacity of unit. Failure to submit such literature could be cause for rejection of bid.

The successful bidder shall furnish two complete copies of installation and operating instructions, along with a parts manual, to the Food Service Director of _____ (district), in addition to one complete set shipped with the equipment.

Any exception or deviation from the equipment specified shall be identified. Failure to identify exceptions or deviations shall be interpreted to indicate that the product offered complies with the specifications in every respect.

Continuing supply of replacement parts and the equipment warranty shall be the responsibility of the manufacturer of such equipment. Service, including parts, shall be available within reasonable distance from installation site in order to assure repair and restoration of operation within 48 hours after the manufacturer's designated service agency has been notified of breakdown. The name and address of the local factory authorized agency and parts source is _____

_____.

The warranty shall cover replacement of defective parts for a period of _____ after acceptance of bid. Labor for repairs shall be provided at no cost, by the equipment contractor for a period of _____ days after acceptance of bid.

The manufacturer or factory designated representative shall properly demonstrate the equipment at a time reasonably convenient for school food service personnel.

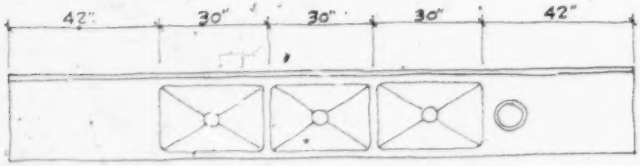
Manufacturer's designated representative shall, at the time of demonstration, ascertain whether equipment has been properly installed and is operating to the satisfaction of the school board and the food service manager responsible for said equipment. Documentary evidence attesting to this shall be in the form of a release to be signed by the contracting officer and the director of food services.

The School Board reserves the right to reject any and all bids.

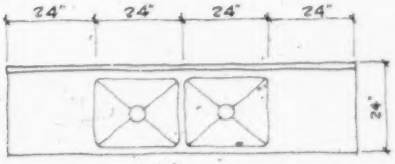
I hereby certify that I have read the enclosed bid request and thoroughly understand its contents. I further certify that my bid will meet all specifications and that delivery will be made as specified.

(DATE)	(NAME OF COMPANY)
(AUTHORIZED SIGNATURE)	(ADDRESS OF COMPANY)
(TITLE)	(TELEPHONE NUMBER)
(TYPEWRITTEN NAME)	

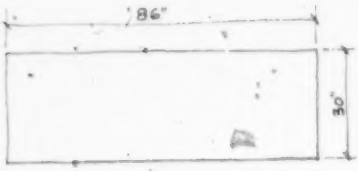
PLAN VIEW TEMPLATES OF KITCHEN EQUIPMENT



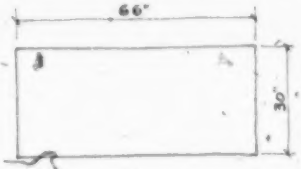
POT SINK AND DRAINBOARDS WITH DISPOSER



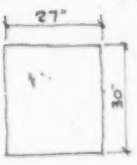
VEGETABLE SINK AND DRAINBOARDS



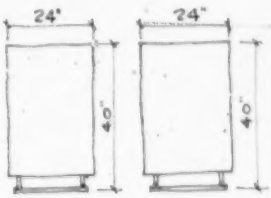
TWO TANK CONVEYOR DISH MACHINE WITH PRE-WASH



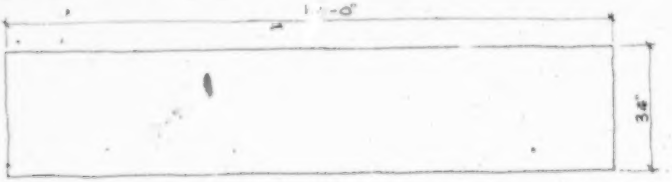
SINGLE TANK RACK CONVEYOR DISH MACHINE WITH PRE-WASH



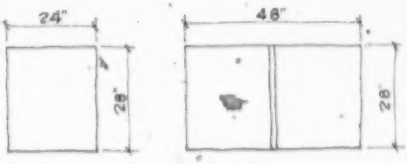
1 TANK DISH MACHINE DOOR TYPE



DISH TRUCK UTILITY TRUCK

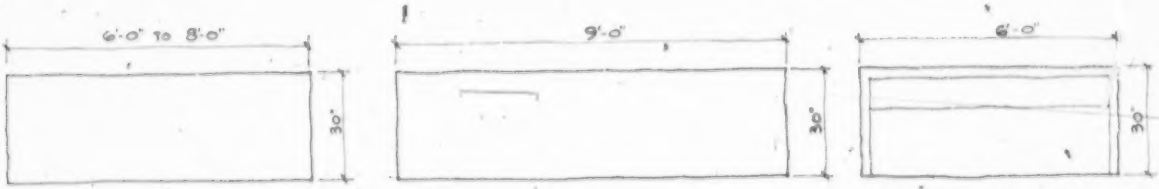


FLIGHT TYPE WARE WASHING



SINGLE COOLING RACK

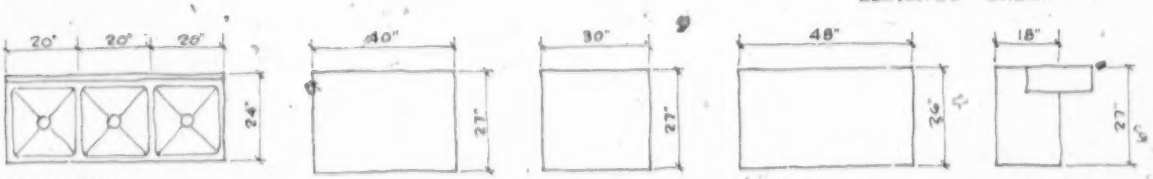
DOUBLE RACK



TABLE

TABLE

BAKERS TABLE WITH ELEVATED SHELF



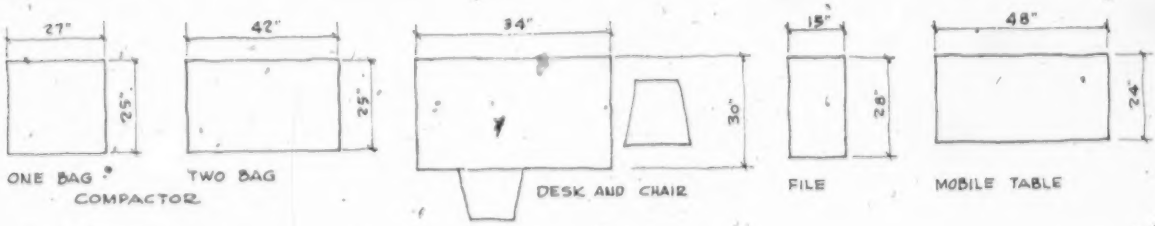
DISH SINK

PLATFORM TRUCK

PLATFORM

UTENSIL RACK

PLATFORM SCALE



ONE BAG COMPACTOR

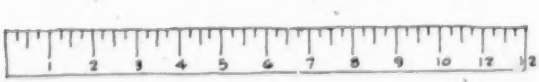
TWO BAG

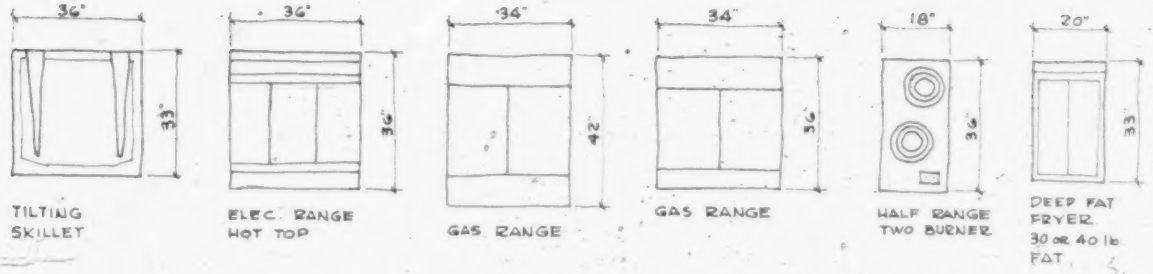
DESK AND CHAIR

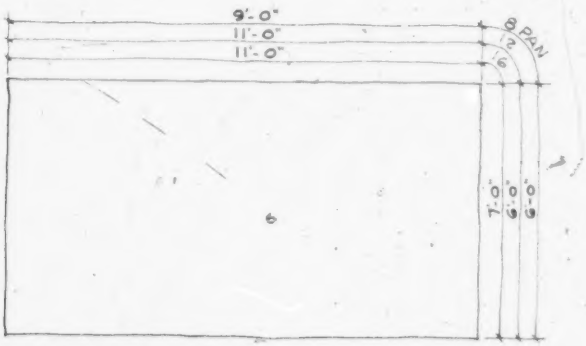
FILE

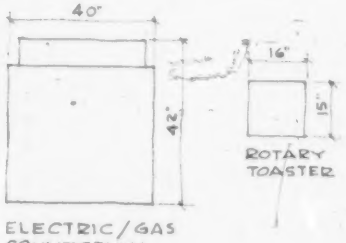
MOBILE TABLE

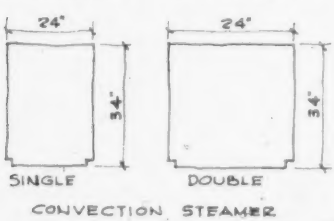
SCALE RULE: EACH NUMBERED SPACE REPRESENTS ONE FOOT FOR TEMPLATES

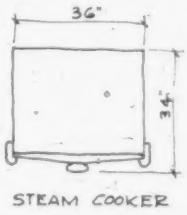


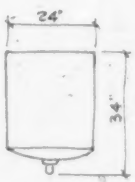


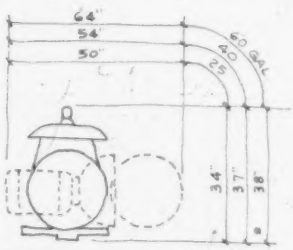


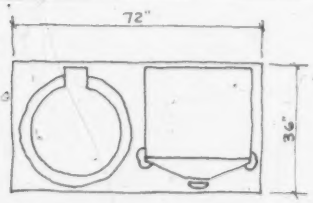


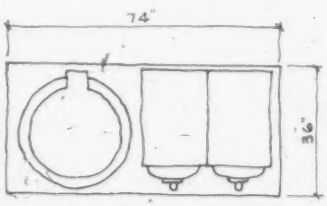


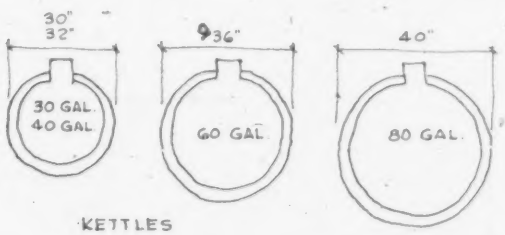


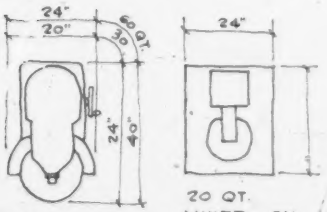


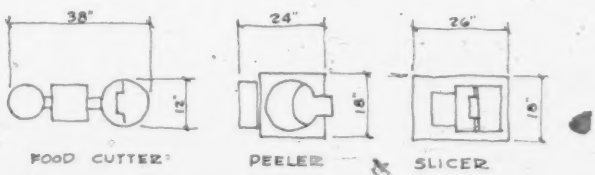


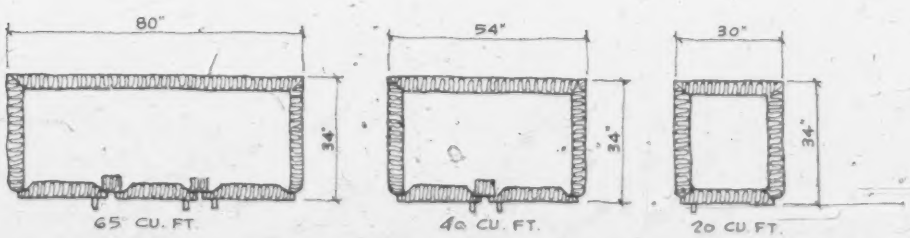






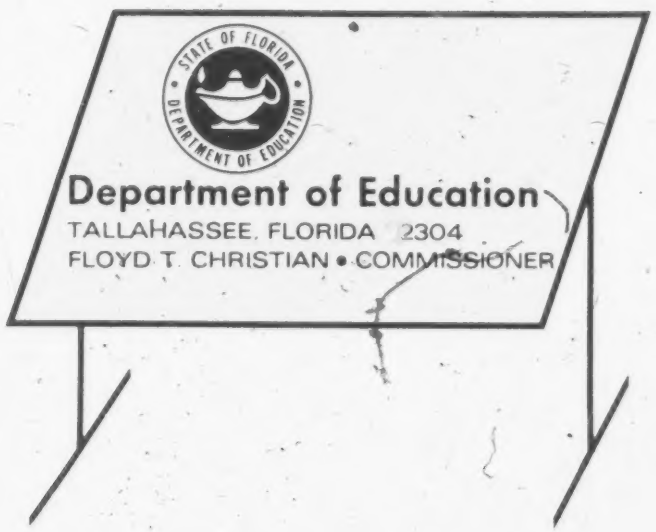






REFRIGERATORS AND FREEZERS

FILMED FROM BEST AVAILABLE COPY



This public document was promulgated at an annual cost of $6,113.90 or $6.11 per copy to serve as a guide to architects, district superintendents, and and food service directors whose responsibility it is to plan food service facilities.